ARKHIPOV, Nikolay Nikolayevich; KARPACHEV, Pavel Spiridonovich; MAYZEL', Maks Mikhaylovich, doktor tekhn. nauk, prof.; PLEVAKO, Nikolay Alekseyevich; ZAYONCHKOVSKIY, A.D., doktor tekhn. nauk, prof., retsenzent; ZOLOTOV, V.I., inzh., retsenzent; ZYBIN, V.P., doktor tekhn. nauk, retsenzent; KAPUSTIN, I.I., doktor tekhn. nauk, prof., retsenzent; KOZLOV, B.A., inzh., retsenzent; POPOV, S.M., doktor tekhn. nauk, prof., retsenzent; EPPEL', S.S., kand. tekhn.nauk, dots., retsenzent; MINAYEVA, T.N., red.; SHVETSOV, S.V., tekhn. red.

[Basic processes, machinery, and apparatus of light industry] Osnovnye protsessy, mashiny i aparaty legkoi promyshlennosti. [By] N.N.Arkhipov i dr. Moskva, Izd-vo nauchno-tekhn. lit-ry RSFSR, 1961. 491 p. (MIRA 15:2)
(Industry)

ARKHIPOV, N.N.; KARPACHEV, P.S.; MAYZEL', M.M., doktor tekhn. nauk, prof.; PLEVAKO, N.A.; UDODOVSKIY, A.N., kand. tekhn. nauk, retsenzent; RYZHOVA, L.P., red. izd-va; EL'KIND, V.D., tekhn. red.

[Fundamentals of the design and construction of standard machines and devices for light industry] Osnovy konstruirovaniia i rascheta tipovykh mashin i apparatov legkoi promyshlennosti. [By] N.N.Arkhipov i dr. Pod red. M.M. Maizelia. Moskva, Mashgiz, 1963. 599 p. (MIRA 16:7)
(Machinery--Design and construction)
(Instruments)

[redacted], A.A., kand. tekhn. nauk, dotsent; [redacted], [redacted], doktor tekhn. nauk, prof.; CHETKOV, K.V., [redacted] tekhn. nauk, prof.; KARPACHEV, P.S., inzh.

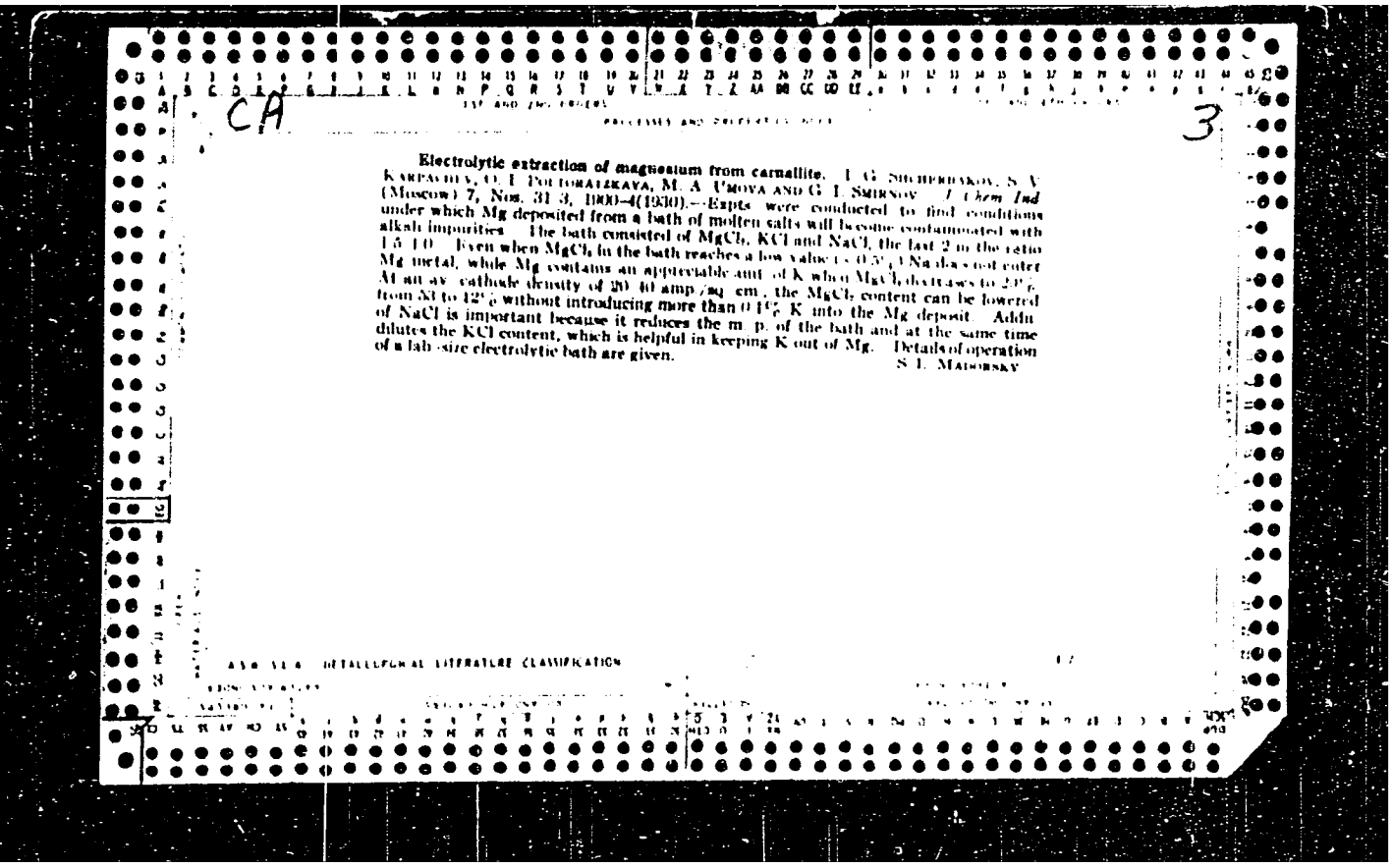
Effect of mechanical actions on the [redacted] penetration in tannin tanning. Nauch. trudy MTIL [redacted]:93-[redacted].

(MIRA 17:11)

1. Kafedra tekhnologii kozhi i mekha[redacted] tekhnologicheskogo instituta legkoy promyshlennosti.

KARPACHEV, Pavel Spiridonovich; MAYZEL, Maks Mikhaylovich, doktor tekhn.nauk,prof.; PLEVAKO, Nikolay Alekseyevich; CHETKIN, Petr Petrovich; ZAYONCHKOVSKIY, A.D., doktor tekhn.nauk,prof., retsenzent; ZOLOTOV, V.I., inzh., retsenzent

[Machinery and apparatus for the manufacture of artificial leather and film materials] Mashiny i apparaty proizvodstv iskusstvennoi kozhi i plenochnykh materialov. [By] P.S.Karpachev i dr. Moskva, Legkaia industriia, 1964. 609 p. (MIRA 18:2)



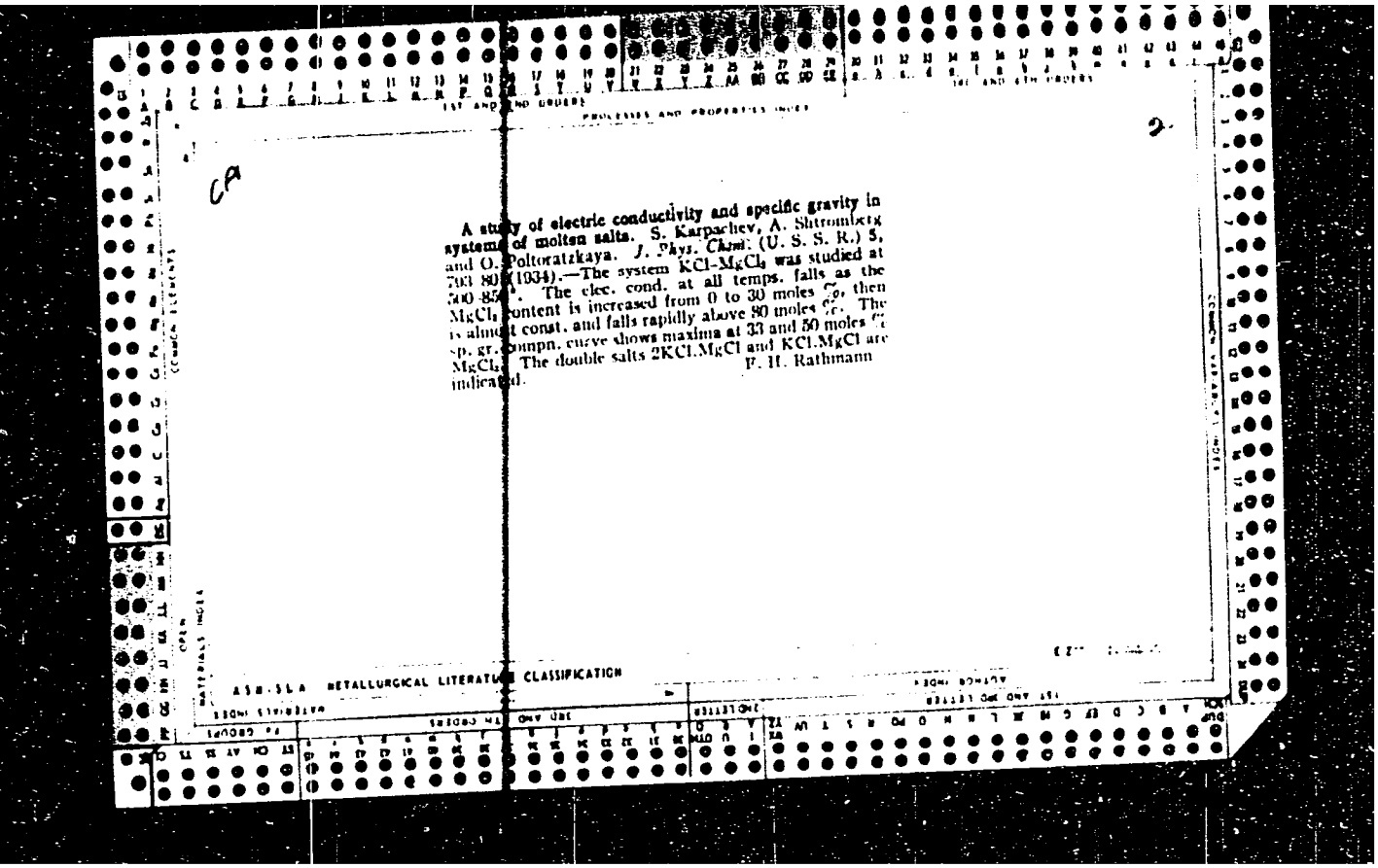
CA

3

Electrolytic extraction of magnesium from carnallite. I. G. Shcherbakov, S. V. Karpachev, O. I. Pototskaya, M. A. Umova and G. I. Smirnov. *J. Chem. Ind.* (Moscow) 7, Nos. 31-3, 1000-4(1930).—Expts. were conducted to find conditions under which Mg deposited from a bath of molten salts will become contaminated with alkali impurities. The bath consisted of $MgCl_2$, KCl and NaCl, the last 2 in the ratio 1.5:1.0. Even when $MgCl_2$ in the bath reaches a low value (< 0.5%) Na does not enter Mg metal, while Mg contains an appreciable amt. of K when $MgCl_2$ decreases to 2.0%. At an av. cathode density of 20-40 amp./sq. cm., the $MgCl_2$ content can be lowered from 8% to 12% without introducing more than 0.1% K into the Mg deposit. Addn. of NaCl is important because it reduces the m. p. of the bath and at the same time dilutes the KCl content, which is helpful in keeping K out of Mg. Details of operation of a lab.-size electrolytic bath are given.

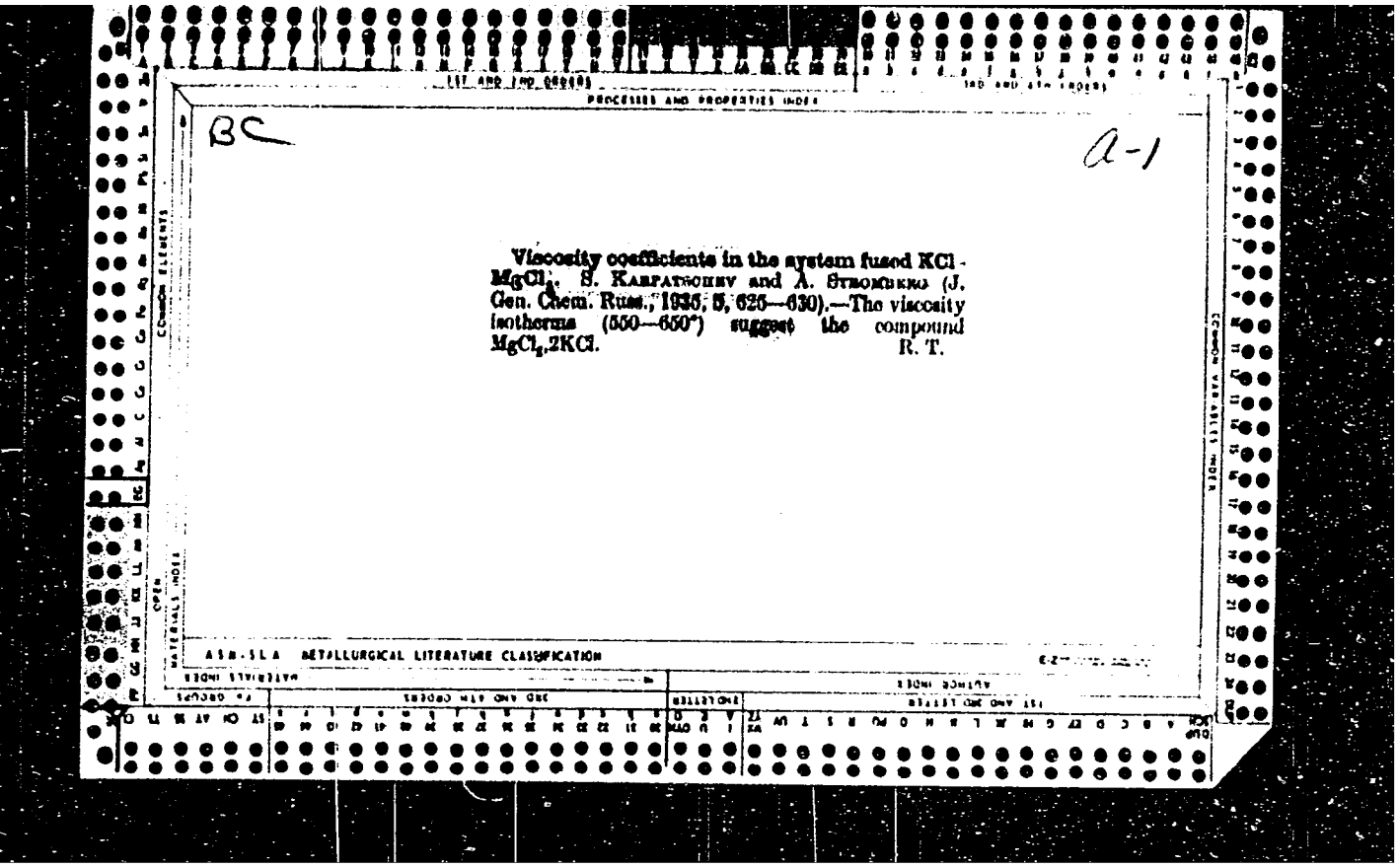
S. L. Madorsky

AVAILABLE METALLURGICAL LITERATURE CLASSIFICATION



A study of electric conductivity and specific gravity in systems of molten salts. S. Karpachev, A. Shtromberg and O. Poltoratzkaya. *J. Phys. Chem.* (U. S. S. R.) 5, 703-80 (1934).—The system KCl-$MgCl_2$ was studied at 740-85°. The elec. cond. at all temps. falls as the $MgCl_2$ content is increased from 0 to 30 moles %, then is almost const. and falls rapidly above 80 moles %. The sp. gr.-compn. curve shows maxima at 33 and 50 moles % $MgCl_2$. The double salts 2KCl.$MgCl_2$ and KCl.$MgCl_2$ are indicated.

P. H. Rathmann



BC

A-1

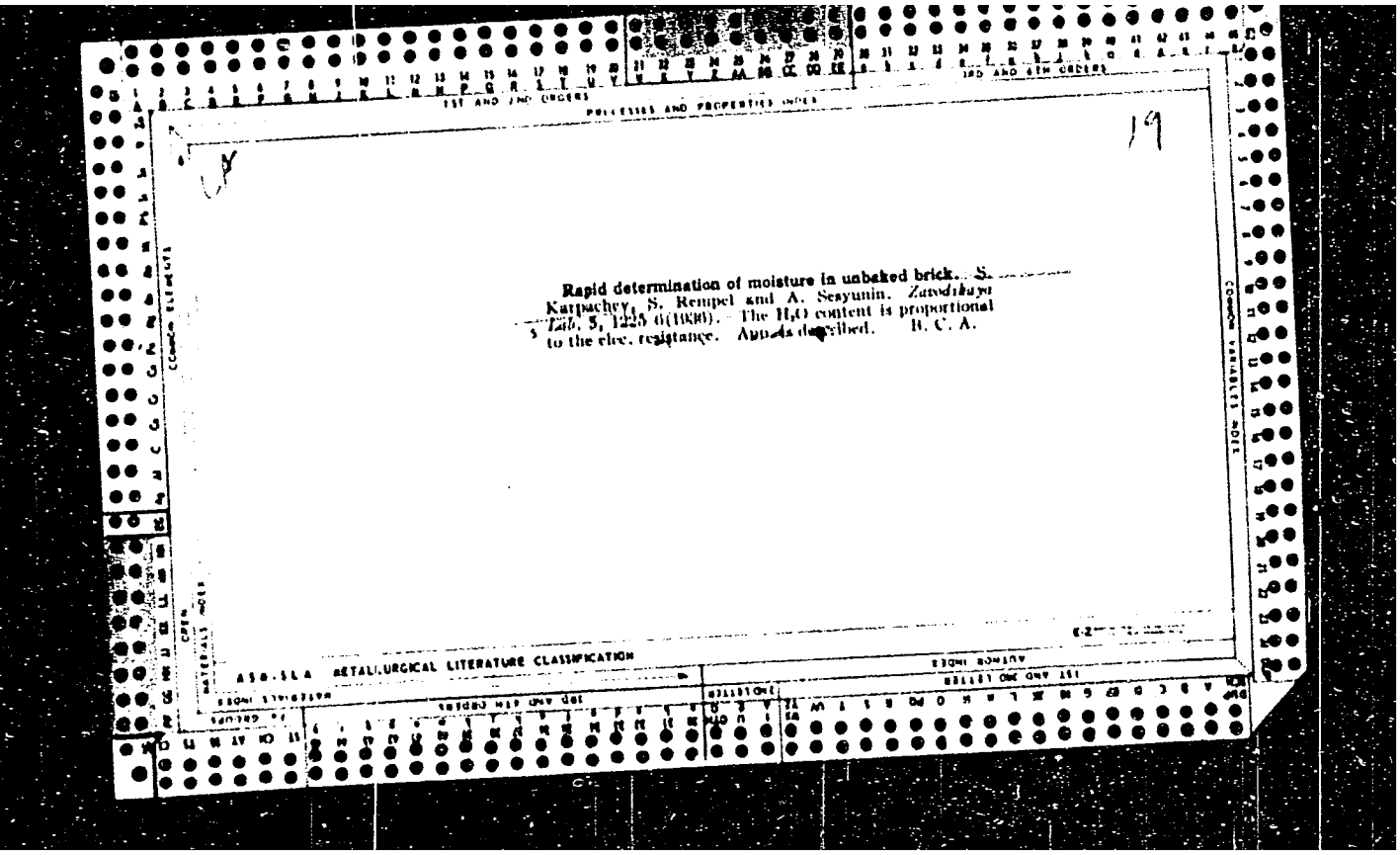
Viscosity coefficients in the system fused KCl - $MgCl_2$. S. Karpatschev and A. Stromberg (J. Gen. Chem. Russ., 1936, 5, 625—630).—The viscosity isotherms (550—650°) suggest the compound $MgCl_2,2KCl$. R. T.

KARPACHEV, S.V.

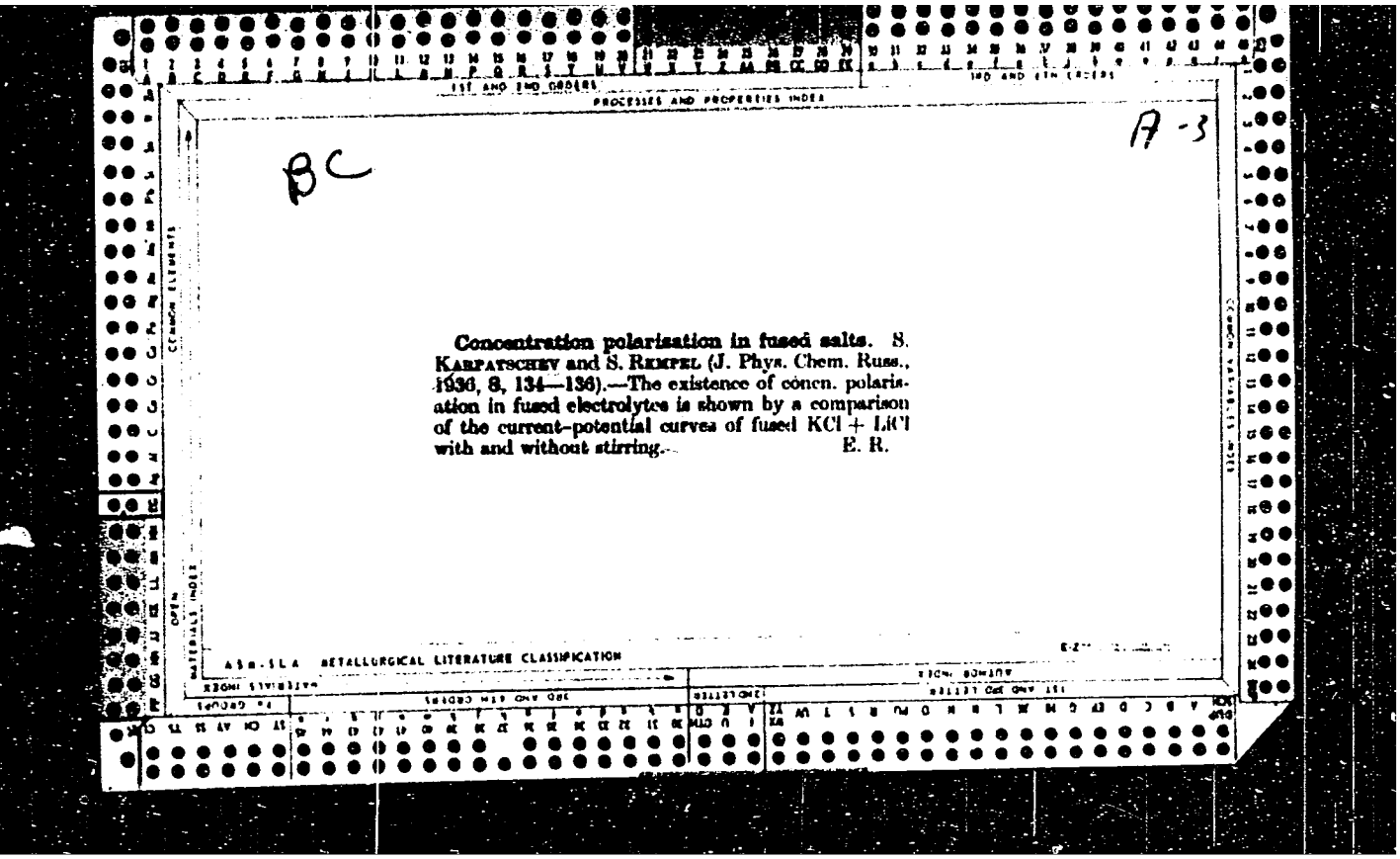
(5)

INTERNAL FRICTION AND ELECTRICAL CONDUCTIVITY IN THE KCl–LiCl SYSTEM OF FUSED SALTS. S. V. Karpachev, A. G. Stromberg, and V. N. Podchainova. Translated from Zhur. Obshchei Khim. 6, 1517-27(1936). 18p. (AEC-tr-1923)

In the interval of temperatures from 400 to 900°, the electrical conductivity and internal friction coefficient for the system of fused salts KCl–LiCl was investigated. On the basis of the results obtained it is shown that direct application of Stokes law for describing the movement of separate ions within the fused salt is inadmissible. (auth)



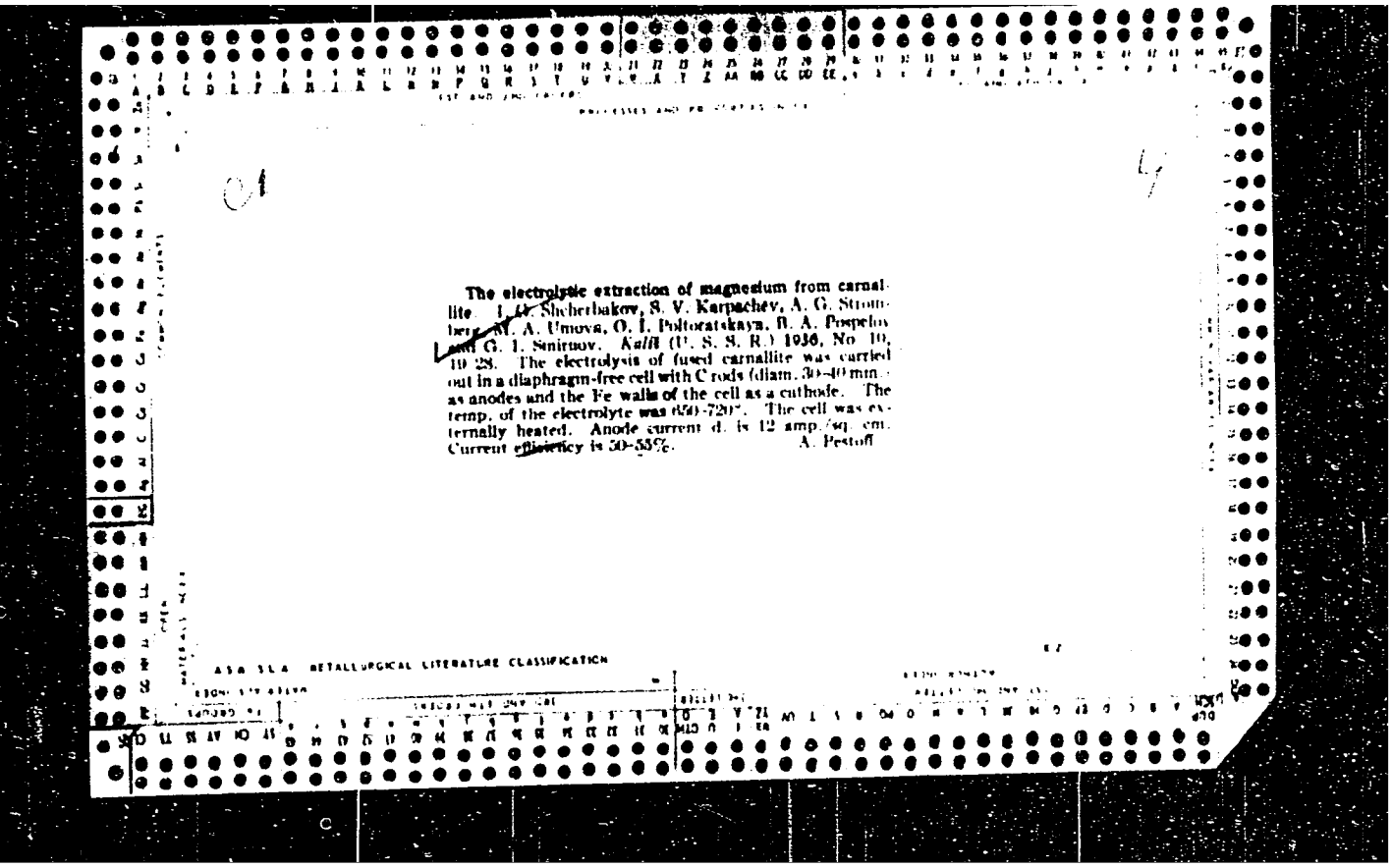
Rapid determination of moisture in unbaked brick. S. Karpachev, S. Rempel and A. Sesyunin. *Zavodskaya Lab.* 5, 1225-6(1936). The H_2O content is proportional to the elec. resistance. Apparatus described. B. C. A.



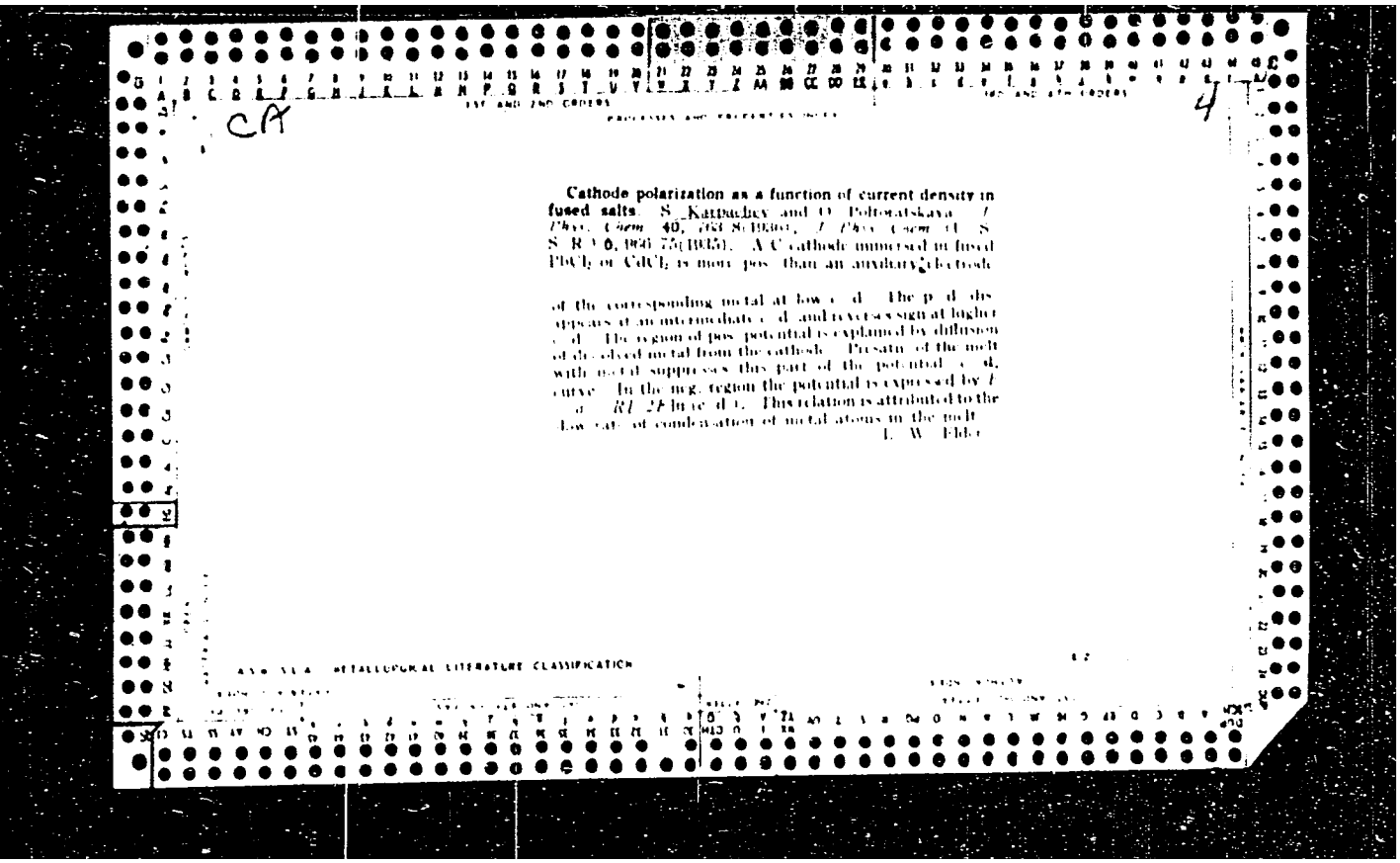
BC

A-3

Concentration polarisation in fused salts. S. KARPATSCHEV and S. REMPEL (J. Phys. Chem. Russ., 1936, 8, 134—136).—The existence of concn. polarisation in fused electrolytes is shown by a comparison of the current–potential curves of fused KCl + LiCl with and without stirring.— E. R.



The electrolytic extraction of magnesium from carnallite. I. V. Shcherbakov, S. V. Karpachev, A. G. Stromberg, M. A. Umova, O. I. Poltoratskaya, B. A. Prepelin and G. I. Smirnov. *Kalii* (U. S. S. R.) 1936, No. 10, 19-28. The electrolysis of fused carnallite was carried out in a diaphragm-free cell with C rods (diam. 30–40 mm.) as anodes and the Fe walls of the cell as a cathode. The temp. of the electrolyte was 650–720°. The cell was externally heated. Anode current d. is 12 amp./sq. cm. Current efficiency is 50–55%. A. Pestoff

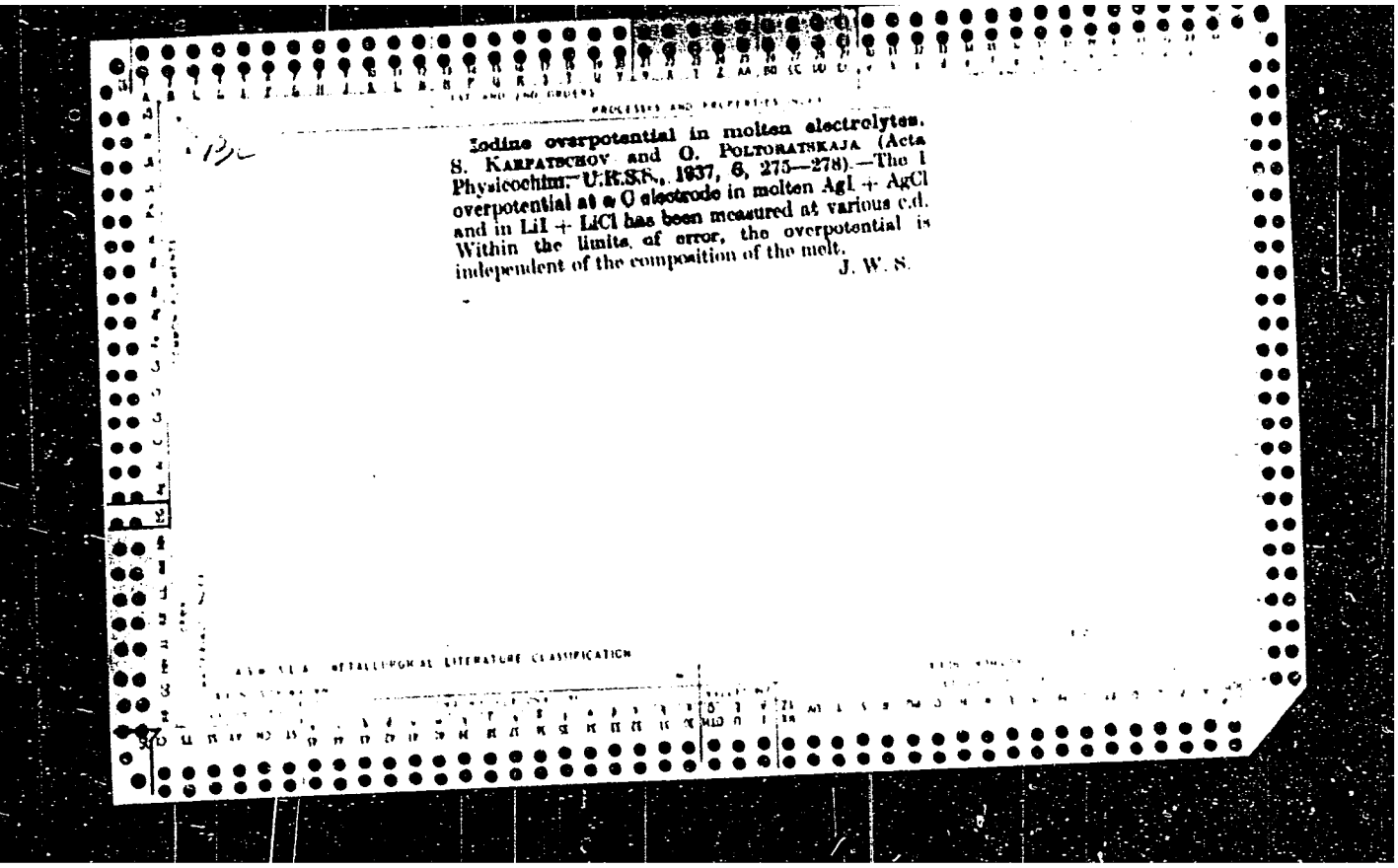


Cathode polarization as a function of current density in fused salts. S. Kaptschev and O. Poltoratskaya. *J. Phys. Chem.* 40, 763-8(1936); *J. Phys. Chem. (U. S. S. R.)* 6, 950-75(1935). A C cathode immersed in fused $PbCl_2$ or $CdCl_2$ is more pos. than an auxiliary electrode of the corresponding metal at low c. d. The p. d. disappears at an intermediate c. d. and reverses sign at higher c. d. The region of pos. potential is explained by diffusion of dissolved metal from the cathode. Presence of the melt with metal suppresses this part of the potential c. d. curve. In the neg. region the potential is expressed by $E = a - RT \ln c$. This relation is attributed to the low rate of condensation of metal atoms in the melt. L. W. Elder

PROCESSES AND PROPERTIES INDEX

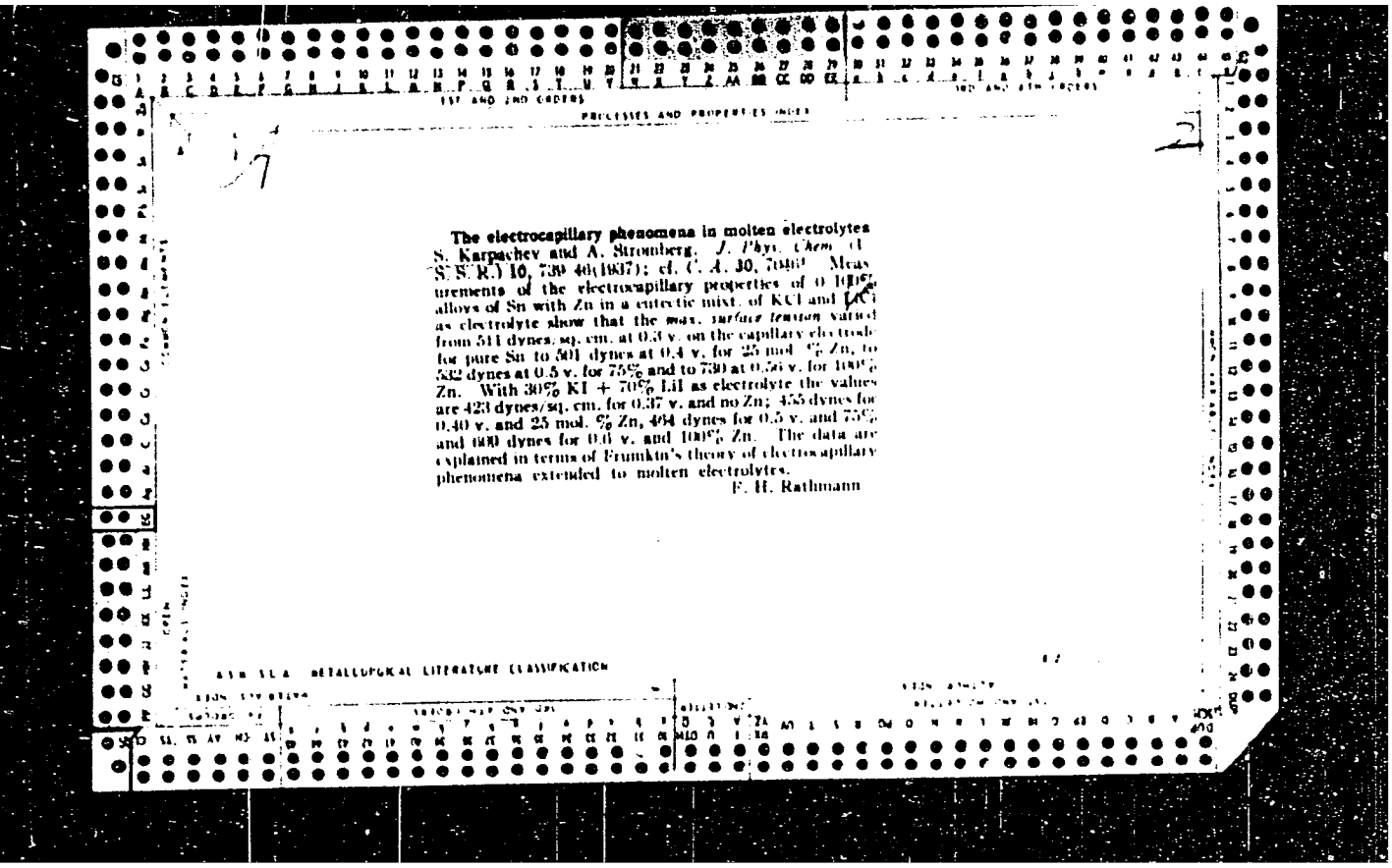
Overvoltage of iodine in molten electrolytes. S. Karpachev and O. Poltoratskaya. *J. Phys. Chem.* (U. S. S. R.) 9, 147-51 (1937).—Data are given on the decompn. potentials of various AgI-AgCl and LiI-LiCl melts. From 100 down to 10% molar percent AgI, the decompn. potential obeys the eq. $E = a - (RT/F) \ln C_{Ag} C_I$. Below 10% AgI, a correction factor for the Cl_2 atm. on the anode must be introduced. The overvoltage is independent of the AgI concn. from 10 to 100%, and depends only on the current intensity. For LiI-LiCl melts also, the overvoltage is independent of LiI concn. from 25 to 100%. F. H. Rathmann

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



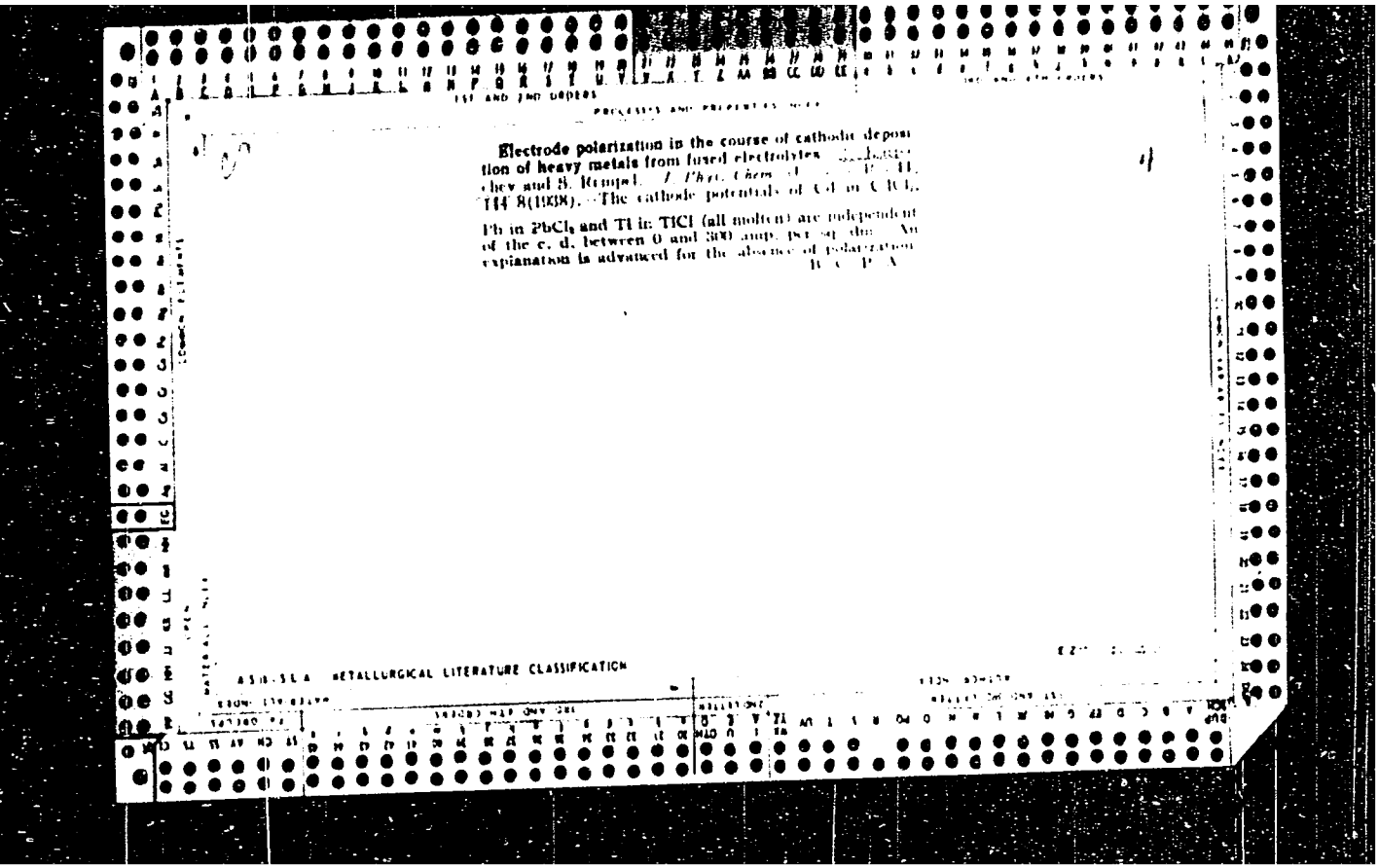
Iodine overpotential in molten electrolytes. S. KARPATSCHOV and O. POLTORATSKAJA (Acta Physicochim. U.R.S.S., 1937, 6, 275—278).—The I overpotential at a C electrode in molten AgI + AgCl and in LiI + LiCl has been measured at various c.d. Within the limits of error, the overpotential is independent of the composition of the melt.

J. W. S.



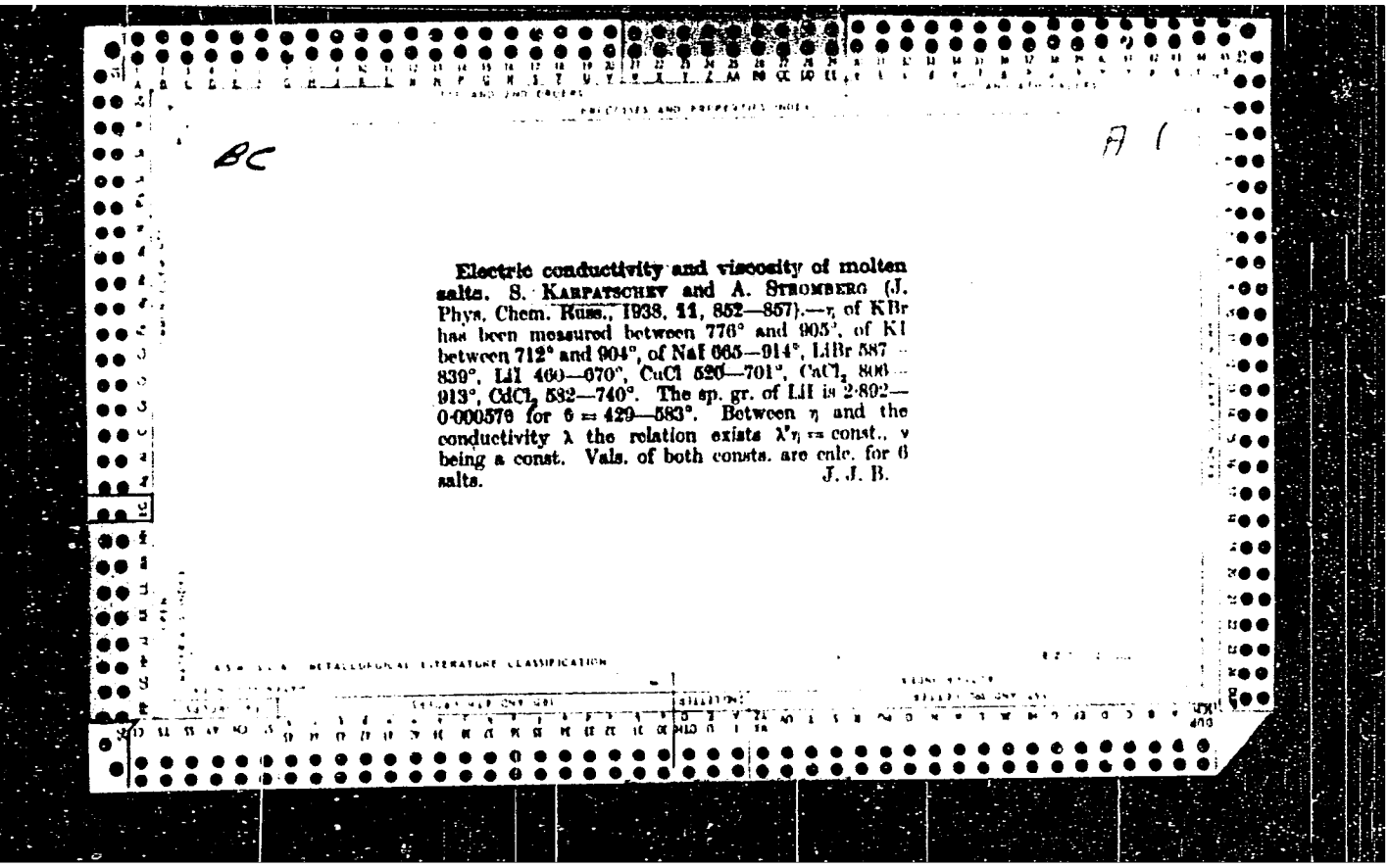
The electrocapillary phenomena in molten electrolytes S. Karpachev and A. Stromberg. *J. Phys. Chem.* (U. S. S. R.) **10**, 739-46(1937); cf. C. A. 30, 7040. Measurements of the electrocapillary properties of 0 100% alloys of Sn with Zn in a eutectic mixt. of KCl and LiCl as electrolyte show that the max. *surface tension* varied from 511 dynes/sq. cm. at 0.3 v. on the capillary electrode for pure Sn to 501 dynes at 0.4 v. for 25 mol. % Zn, to 532 dynes at 0.5 v. for 75% and to 730 at 0.76 v. for 100% Zn. With 30% KI + 70% LiI as electrolyte the values are 423 dynes/sq. cm. for 0.37 v. and no Zn; 455 dynes for 0.40 v. and 25 mol. % Zn, 494 dynes for 0.5 v. and 75% and 600 dynes for 0.6 v. and 100% Zn. The data are explained in terms of Frumkin's theory of electrocapillary phenomena extended to molten electrolytes.

F. H. Rathmann



Electrode polarization in the course of cathodic deposition of heavy metals from fused electrolytes [illegible] chev and S. Rempel. *Z. Phys. Chem.* [illegible] P. H. 114 8(1938).—The cathode potentials of Cd in $CdCl_2$, Pb in $PbCl_2$ and Tl in TlCl (all molten) are independent of the c. d. between 0 and 300 amp. per sq. dm. No explanation is advanced for the absence of polarization [illegible] P. A.

A.S.M.-S.L.A. METALLURGICAL LITERATURE CLASSIFICATION



BC

A 1

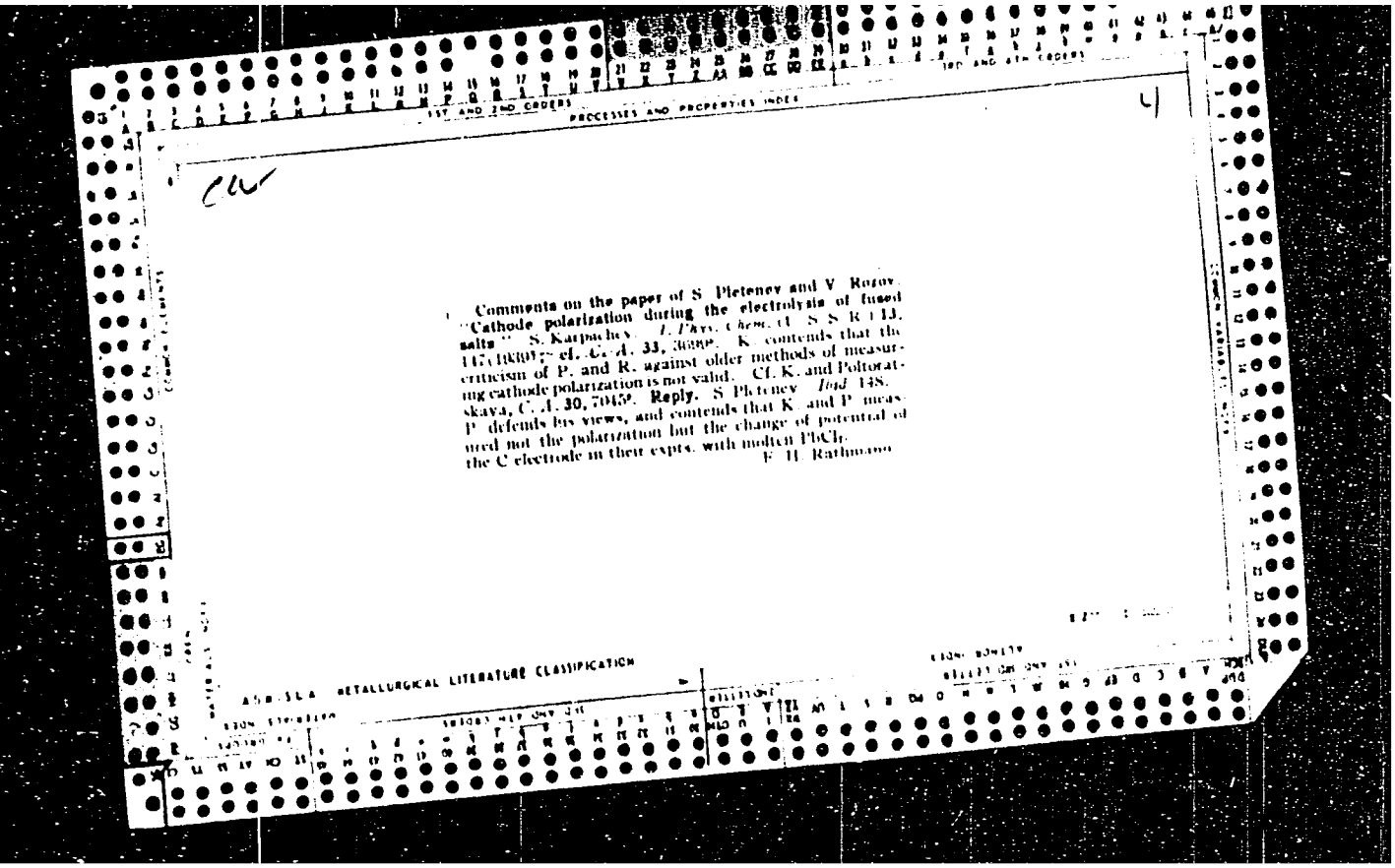
Electric conductivity and viscosity of molten salts. S. KARPATSCHEV and A. STROMBERG (J. Phys. Chem. Russ., 1938, **11**, 852—857).—η of KBr has been measured between 776° and 905°, of KI between 712° and 904°, of NaI 665—914°, LiBr 587—839°, LiI 460—670°, CuCl 520—701°, $CaCl_2$ 806—913°, $CdCl_2$ 592—740°. The sp. gr. of LiI is 2·802—0·000576 θ for θ = 429—583°. Between η and the conductivity λ the relation exists $\lambda^{\nu}\eta$ = const., ν being a const. Vals. of both consts. are calc. for 6 salts.

J. J. B.

KARPACHEV

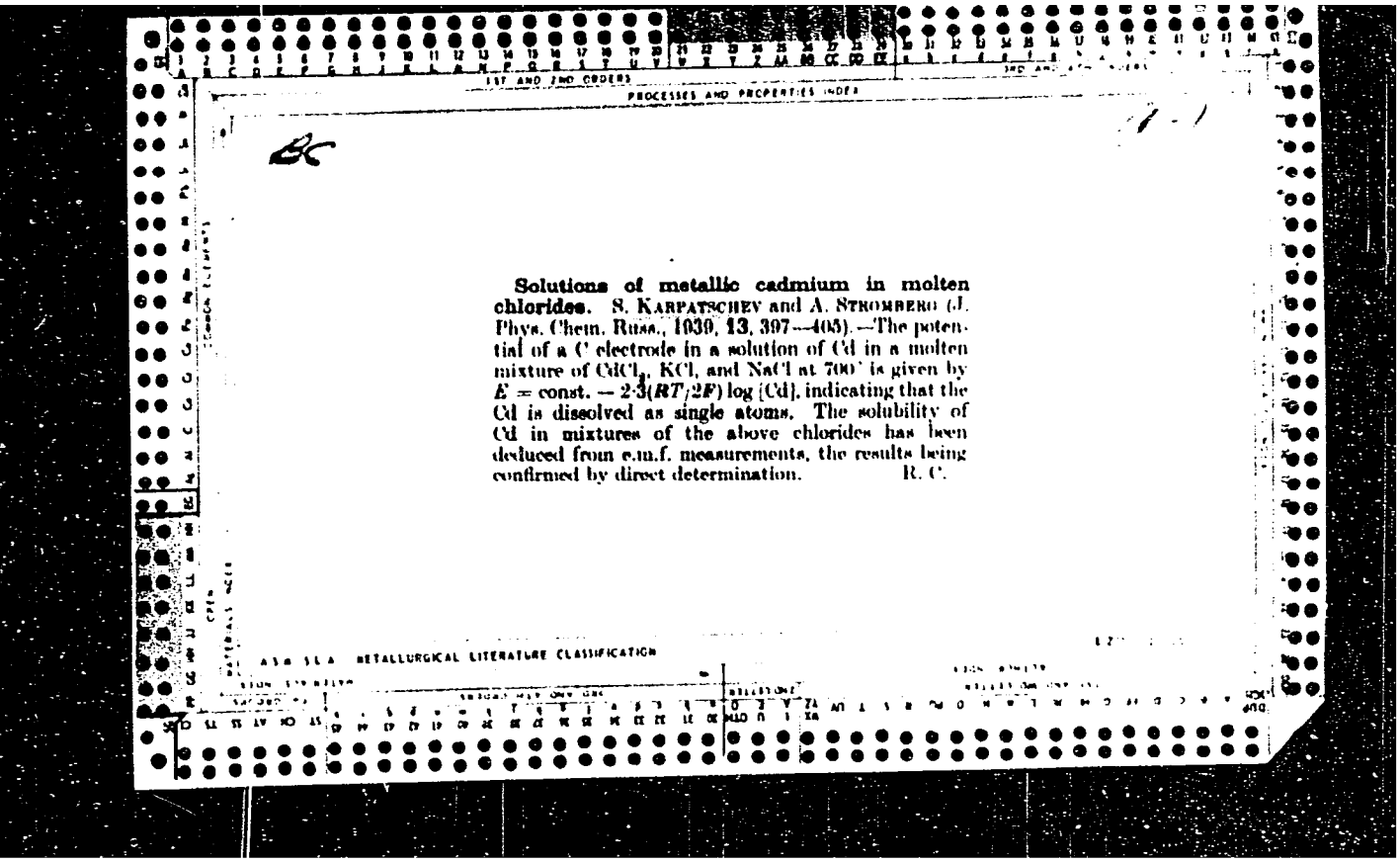
"On the Work of S. Pletenev and V. Rozov, "Cathode Polarization during the Electrolysis of Molten Substances"; Zhur. Fiz. Khim., 12, No. 1, 1939.

Report U-1613, 3 Jan. 1952



Comments on the paper of S. Pletenev and V. Rozov, "Cathode polarization during the electrolysis of fused salts." S. Karpachev. *J. Phys. Chem.* (J. S. S. R.) 13, 1167(1939); cf. C. A. 33, 3689. K. contends that the criticism of P. and R. against older methods of measuring cathode polarization is not valid. Cf. K. and Poltoratskaya, C. A. 30, 7049. **Reply.** S. Pletenev *Ibid* 148. P. defends his views, and contends that K. and P. measured not the polarization but the change of potential of the C electrode in their expts. with molten PbCl$_2$.

F. H. Rathmann

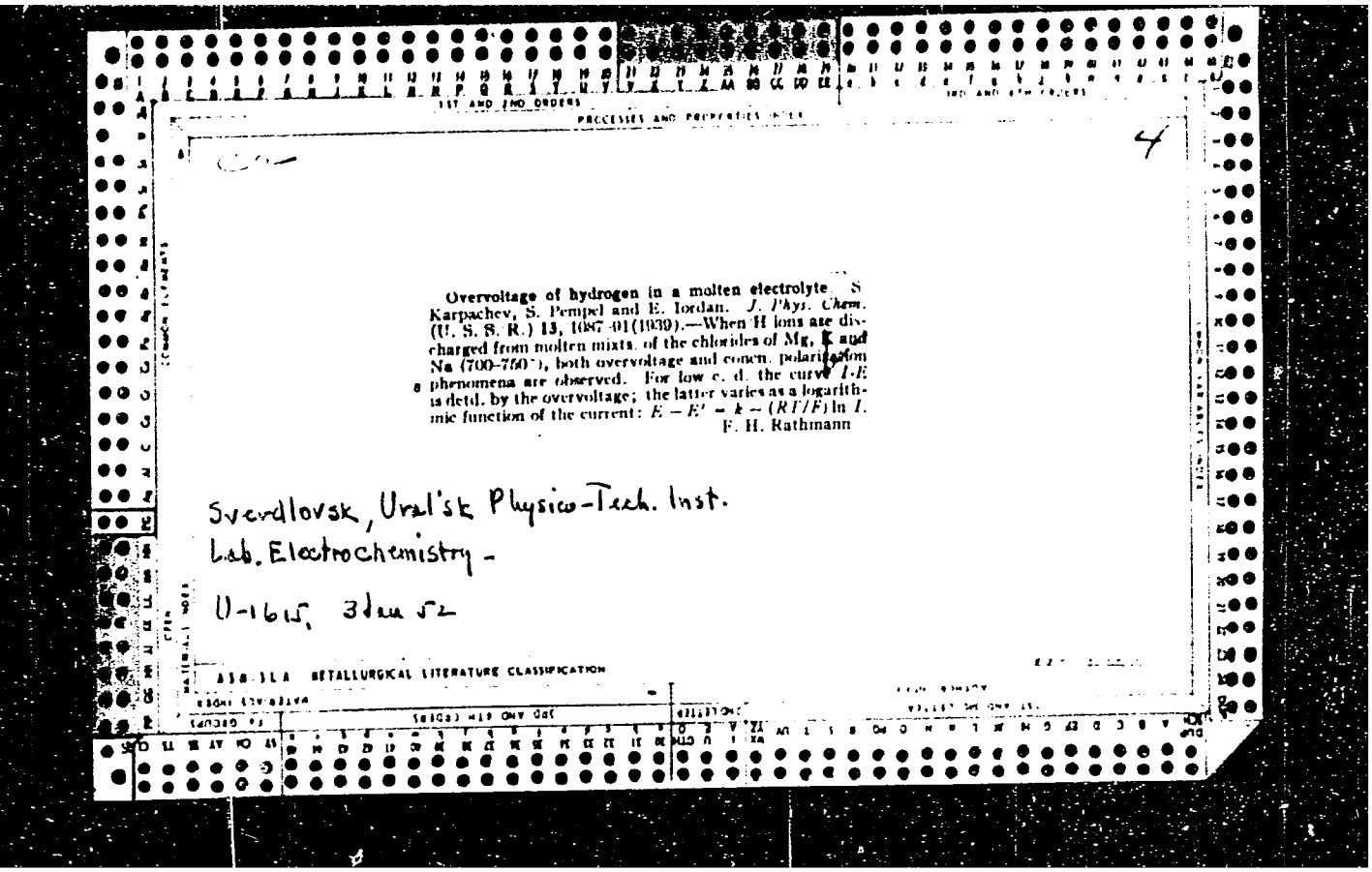


Solutions of metallic cadmium in molten chlorides. S. KARPATSCHEV and A. STROMBERG (J. Phys. Chem. Russ., 1939, **13**, 397—405).—The potential of a C electrode in a solution of Cd in a molten mixture of $CdCl_2$, KCl, and NaCl at 700° is given by $E = \text{const.} - 2{\cdot}3(RT/2F)\log[Cd]$, indicating that the Cd is dissolved as single atoms. The solubility of Cd in mixtures of the above chlorides has been deduced from e.m.f. measurements, the results being confirmed by direct determination. R. C.

KARPACHEV, S., STROMBERG, A.

"On Solutions of Metallic Cadmium in Molten Chlorides"; Zhur. Fiz. Khim; 13, No. 3, 1939; Ural Physico-Tech. Insti., Lab. of Electrochem., Sverdlovsk; Rcd 28 Jul. 1938.

Report U-1613, 3 Jan. 1952

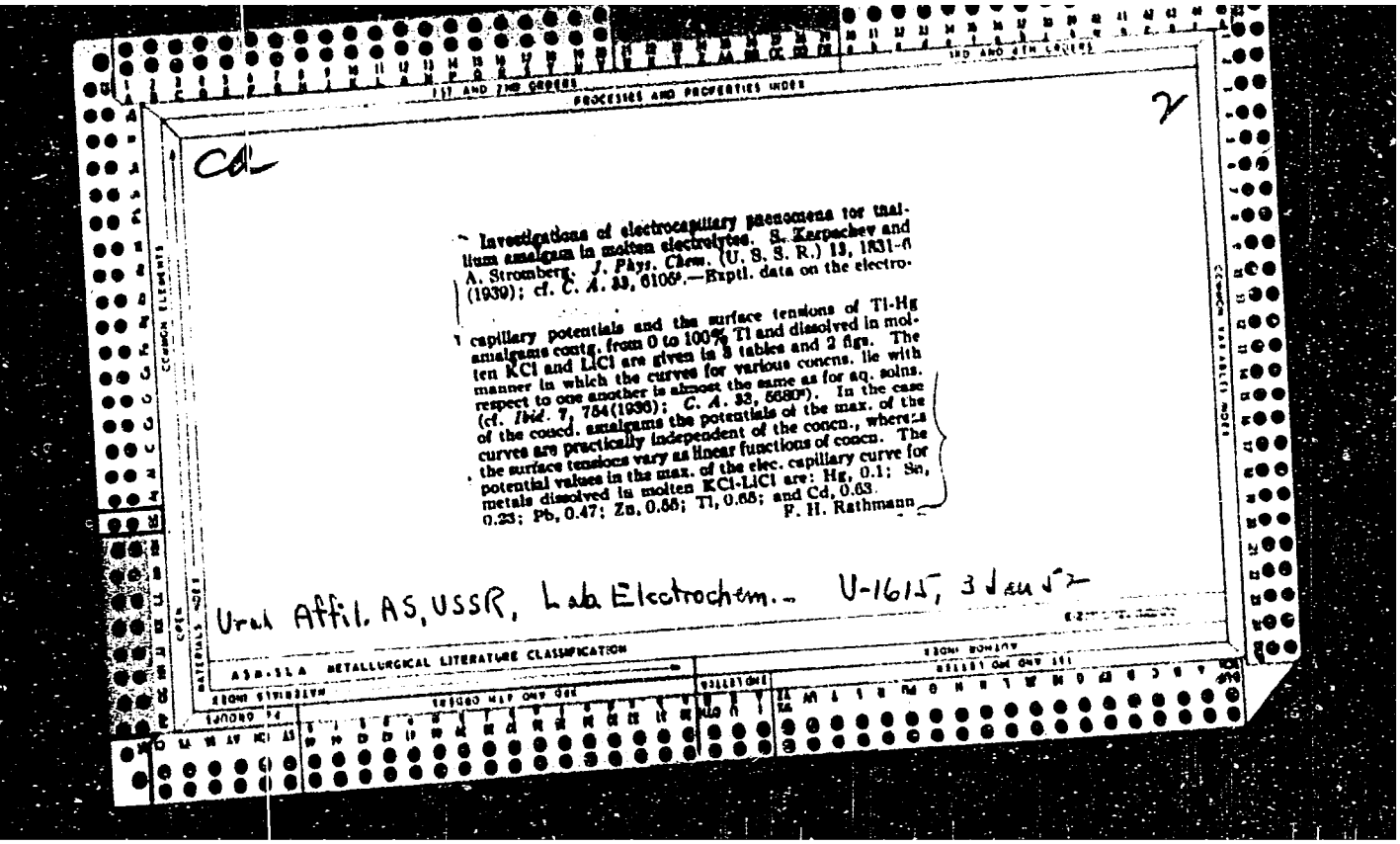


Overvoltage of hydrogen in a molten electrolyte. S Karpachev, S. Pempel and E. Iordan. *J. Phys. Chem.* (U. S. S. R.) 13, 1087-91(1939).—When H ions are discharged from molten mixts. of the chlorides of Mg, K and Na (700–750°), both overvoltage and concn. polarization phenomena are observed. For low c. d. the curve *I-E* is detd. by the overvoltage; the latter varies as a logarithmic function of the current: $E = E' - k - (RT/F) \ln I$.
F. H. Rathmann

Sverdlovsk, Ural'sk Physico-Tech. Inst.
Lab. Electrochemistry -

U-1615, 3 Jan 52

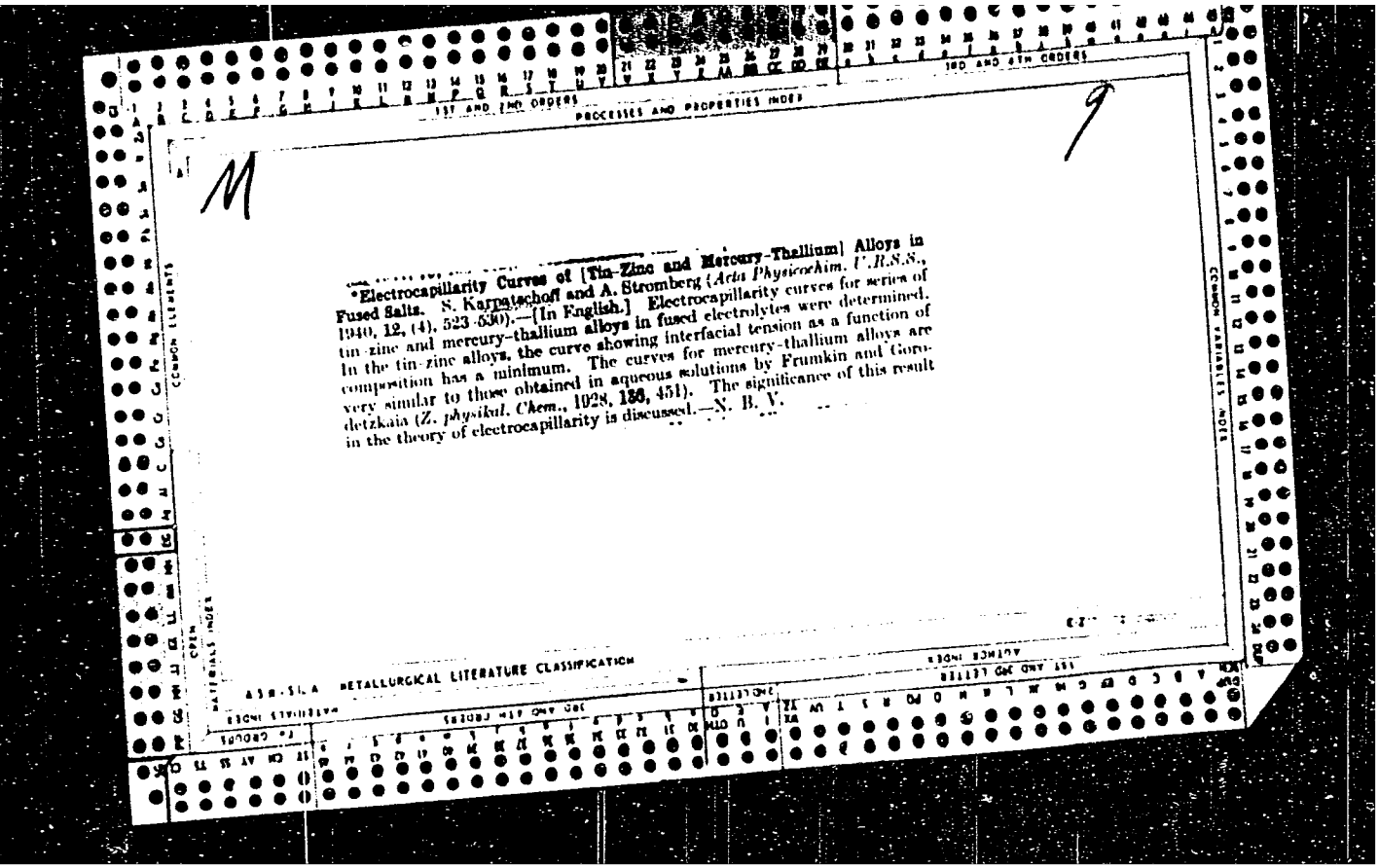
A1a-1La METALLURGICAL LITERATURE CLASSIFICATION



Cd

Investigations of electrocapillary phenomena for thallium amalgam in molten electrolytes. S. Kerpachev and A. Stromberg. *J. Phys. Chem.* (U. S. S. R.) 13, 1831-6 (1939); cf. *C. A.* 33, 6106⁹.—Exptl. data on the electrocapillary potentials and the surface tensions of Tl-Hg amalgams contg. from 0 to 100% Tl and dissolved in molten KCl and LiCl are given in 3 tables and 2 figs. The manner in which the curves for various concns. lie with respect to one another is almost the same as for aq. solns. (cf. *Ibid.* 7, 784(1936); *C. A.* 32, 5680⁹). In the case of the concd. amalgams the potentials of the max. of the curves are practically independent of the concn., whereas the surface tensions vary as linear functions of concn. The potential values in the max. of the elec. capillary curve for metals dissolved in molten KCl-LiCl are: Hg, 0.1; Sn, 0.23; Pb, 0.47; Zn, 0.66; Tl, 0.68; and Cd, 0.63.
F. H. Rathmann

Ural Affil. AS, USSR, Lab Electrochem.. U-1615, 3 Jan 52



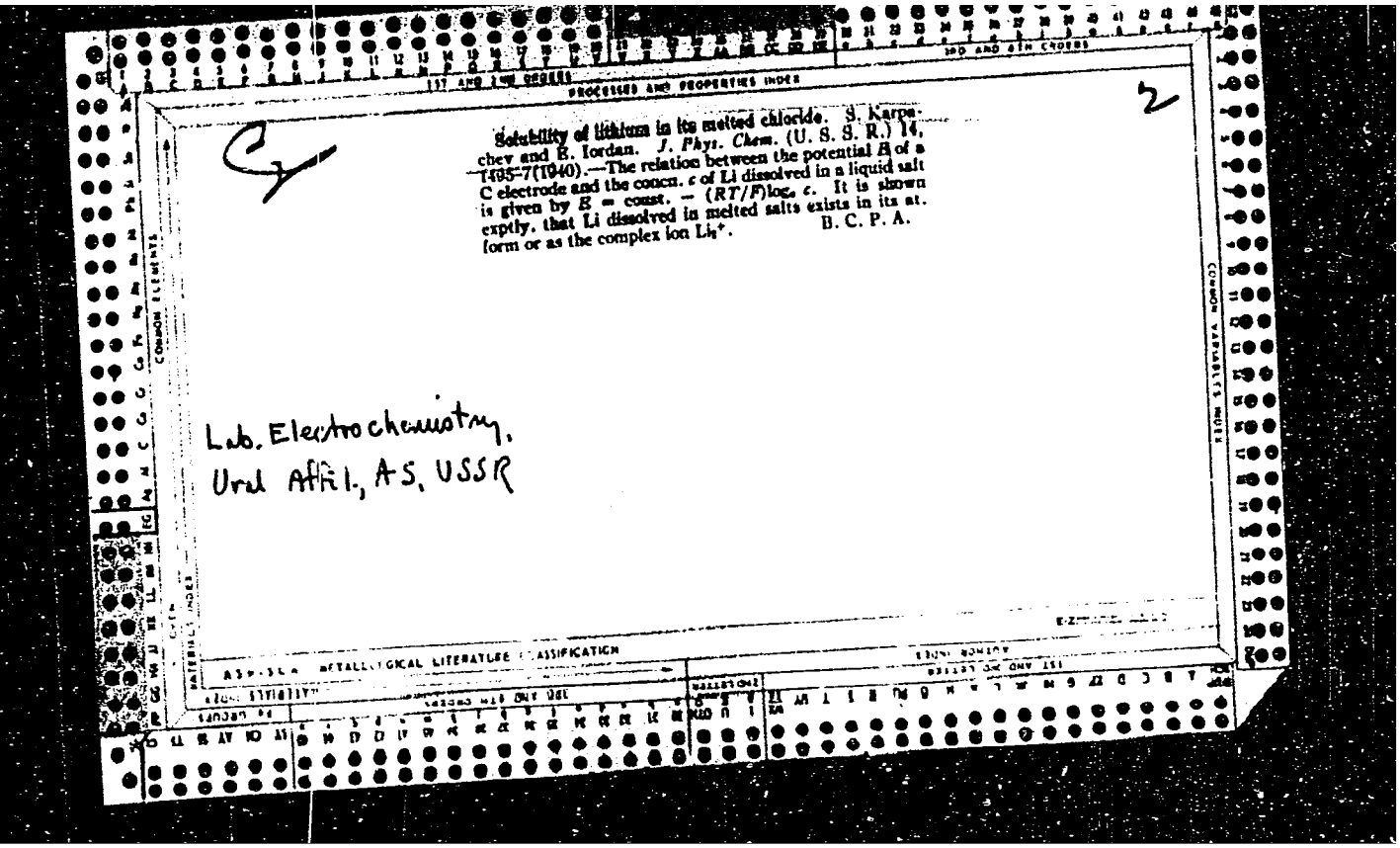
PROCESSES AND PROPERTIES INDEX

M

9

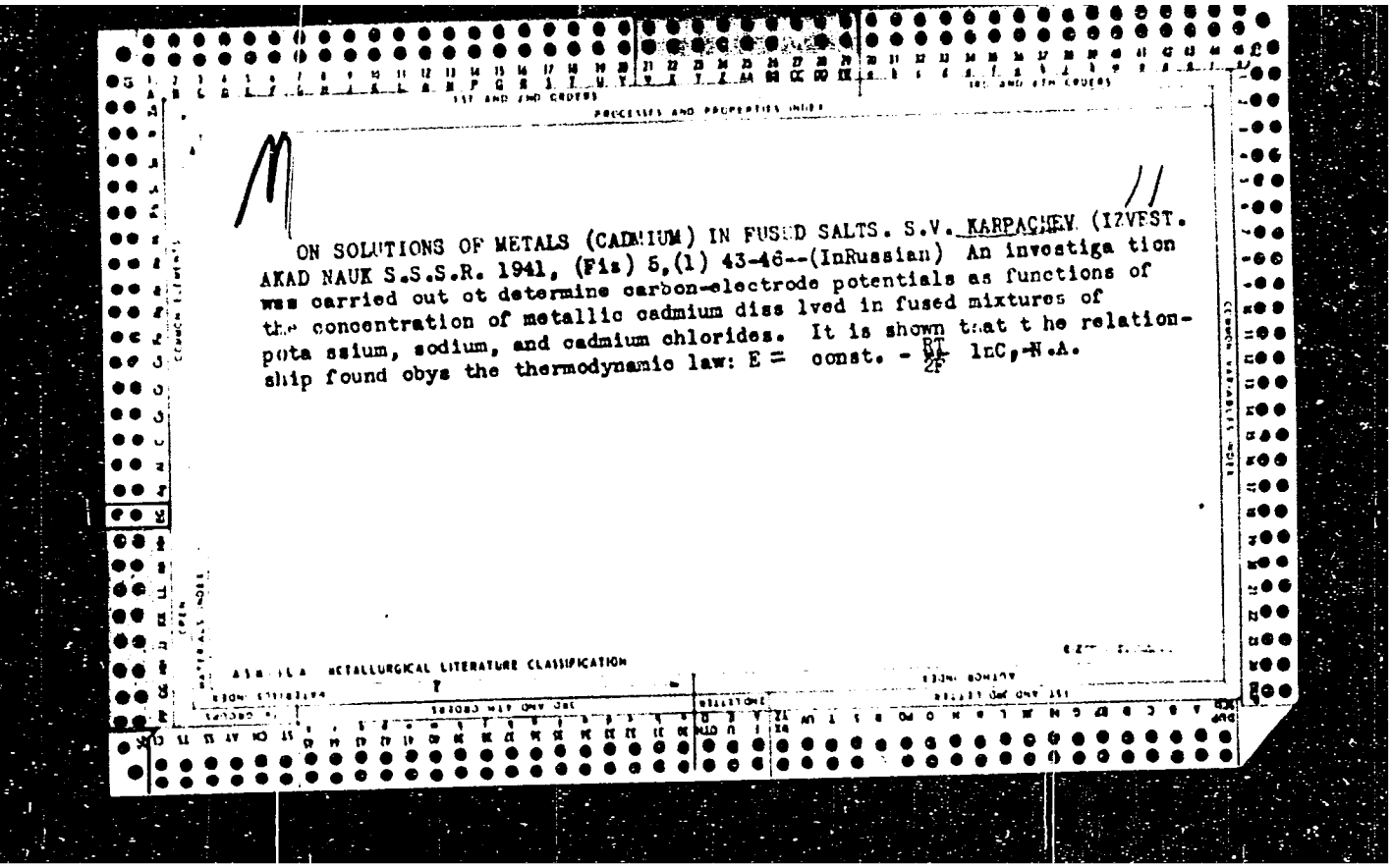
•Electrocapillarity Curves of [Tin-Zinc and Mercury-Thallium] Alloys in Fused Salts. S. Karpatschoff and A. Stromberg (*Acta Physicochim. U.R.S.S.*, 1940, **12**, (4), 523–530).—[In English.] Electrocapillarity curves for series of tin-zinc and mercury-thallium alloys in fused electrolytes were determined. In the tin-zinc alloys, the curve showing interfacial tension as a function of composition has a minimum. The curves for mercury-thallium alloys are very similar to those obtained in aqueous solutions by Frumkin and Gorodetzkaia (*Z. physikal. Chem.*, 1928, **136**, 451). The significance of this result in the theory of electrocapillarity is discussed.—N. B. V.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

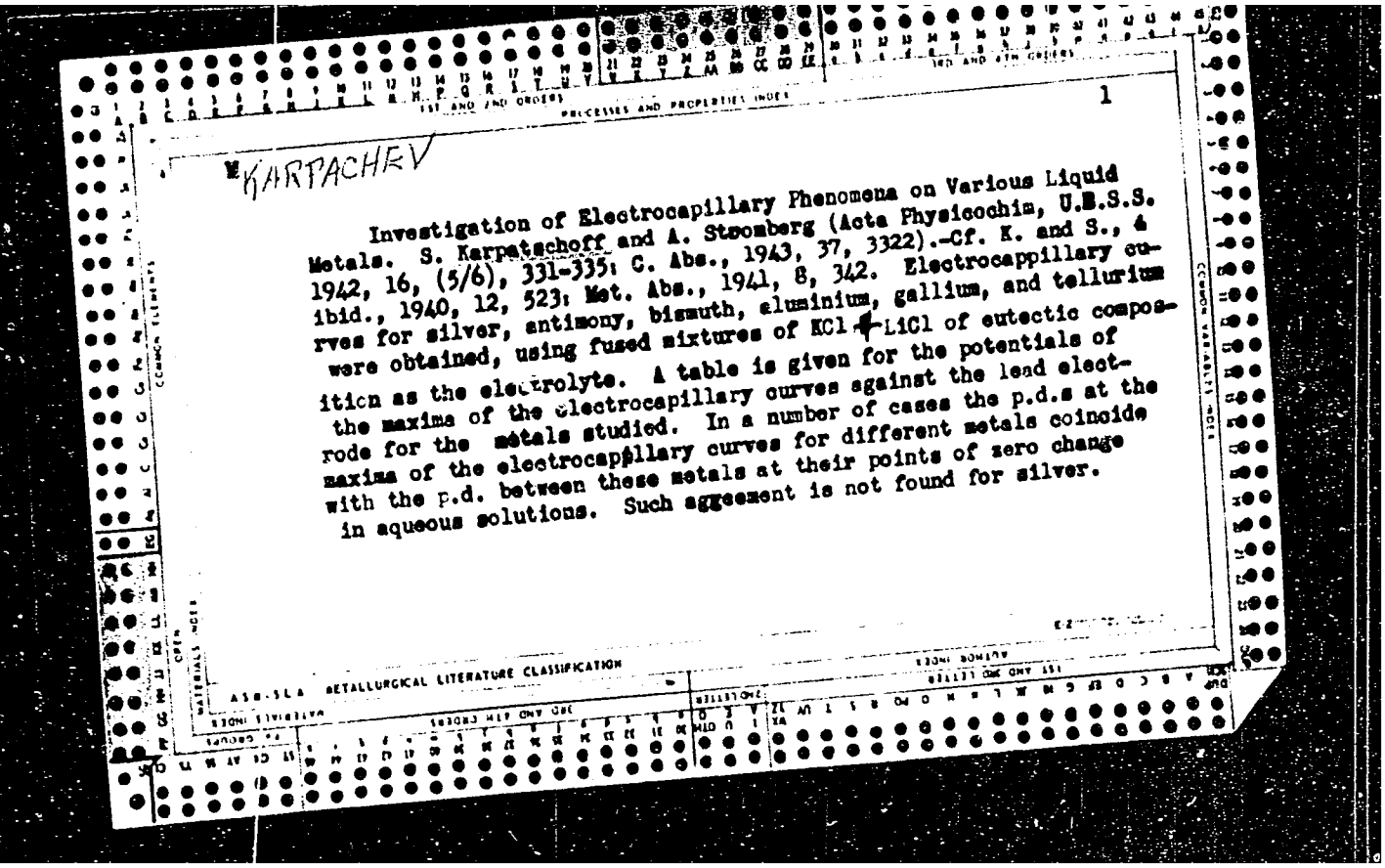


Solubility of lithium in its melted chloride. S. Karpachev and B. Iordan. *J. Phys. Chem.* (U. S. S. R.) 14, 1495-7(1940).—The relation between the potential E of a C electrode and the concn. c of Li dissolved in a liquid salt is given by $E = \text{const.} - (RT/F)\log_e c$. It is shown exptly. that Li dissolved in melted salts exists in its at. form or as the complex ion Li_4^+. B. C. P. A.

Lab. Electrochemistry, Ural Affil., A.S. USSR



ON SOLUTIONS OF METALS (CADMIUM) IN FUSED SALTS. S.V. KARPACHEV. (IZVEST. AKAD NAUK S.S.S.R. 1941, (Fis) 5,(1) 43-46--(InRussian) An investiga tion was carried out ot determine carbon-electrode potentials as functions of the concentration of metallic cadmium diss lved in fused mixtures of pota ssium, sodium, and cadmium chlorides. It is shown that t he relationship found obys the thermodynamic law: $E = \text{const.} - \frac{RT}{2F} \ln C$, -N.A.



1

KARPACHEV

Investigation of Electrocapillary Phenomena on Various Liquid Metals. S. Karpatschoff and A. Stromberg (Acta Physicochim, U.R.S.S. 1942, 16, (5/6), 331-335; C. Abs., 1943, 37, 3322).-Cf. K. and S., & ibid., 1940, 12, 523; Met. Abs., 1941, 8, 342. Electrocappillary curves for silver, antimony, bismuth, aluminium, gallium, and tellurium were obtained, using fused mixtures of KCl + LiCl of eutectic composition as the electrolyte. A table is given for the potentials of the maxima of the electrocapillary curves against the lead electrode for the metals studied. In a number of cases the p.d.s at the maxima of the electrocapillary curves for different metals coincide with the p.d. between these metals at their points of zero charge in aqueous solutions. Such aggreement is not found for silver.

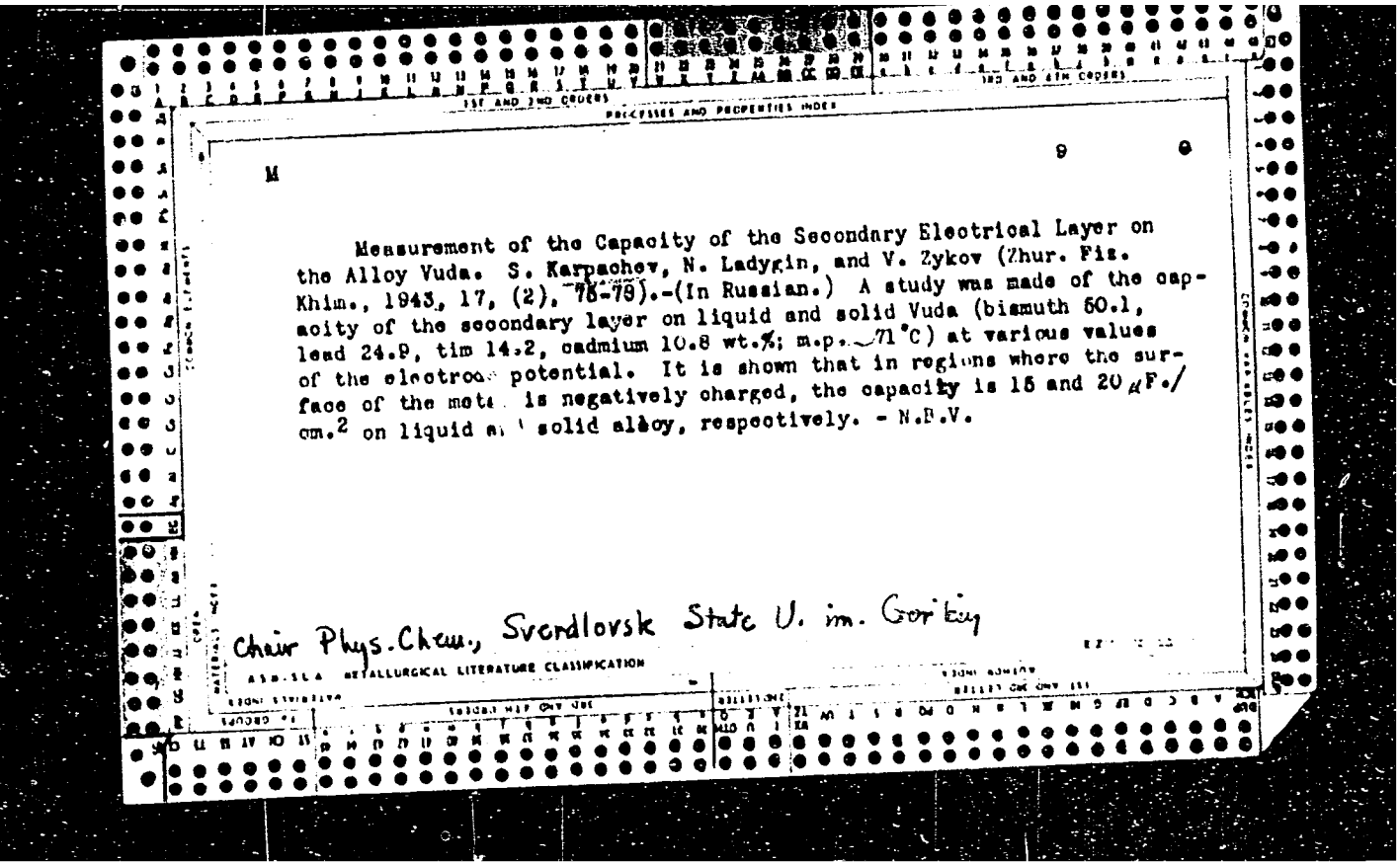
Solutions of lead in its fused chloride. S. Karpatschev, A. Stromberg, and E. Jordan (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **36**, 101—104).—From measurements of the potential of a C electrode in a solution of Pb in fused $PbCl_2$ at 700° as a function of the concn. of the metal, it is concluded that the Pb goes into solution as a univalent positive ion. The solubility of Pb in $PbCl_2$ at 700° is 0·0417%. H. J. W.

KARPACHEV, S., STROMBERG, A.

Mbr. Lab of Electrochemistry, Ural Affiliate of the Acad. of Sci., USSR; (-1941-)

"The Contact Difference of Potentials Between Mercury and an Amalgam of Thallium"
Zhur. Fiz. Khim. Vol 17, No. 1, 1943

BR-52059019



1ST AND 2ND CODERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH CODERS

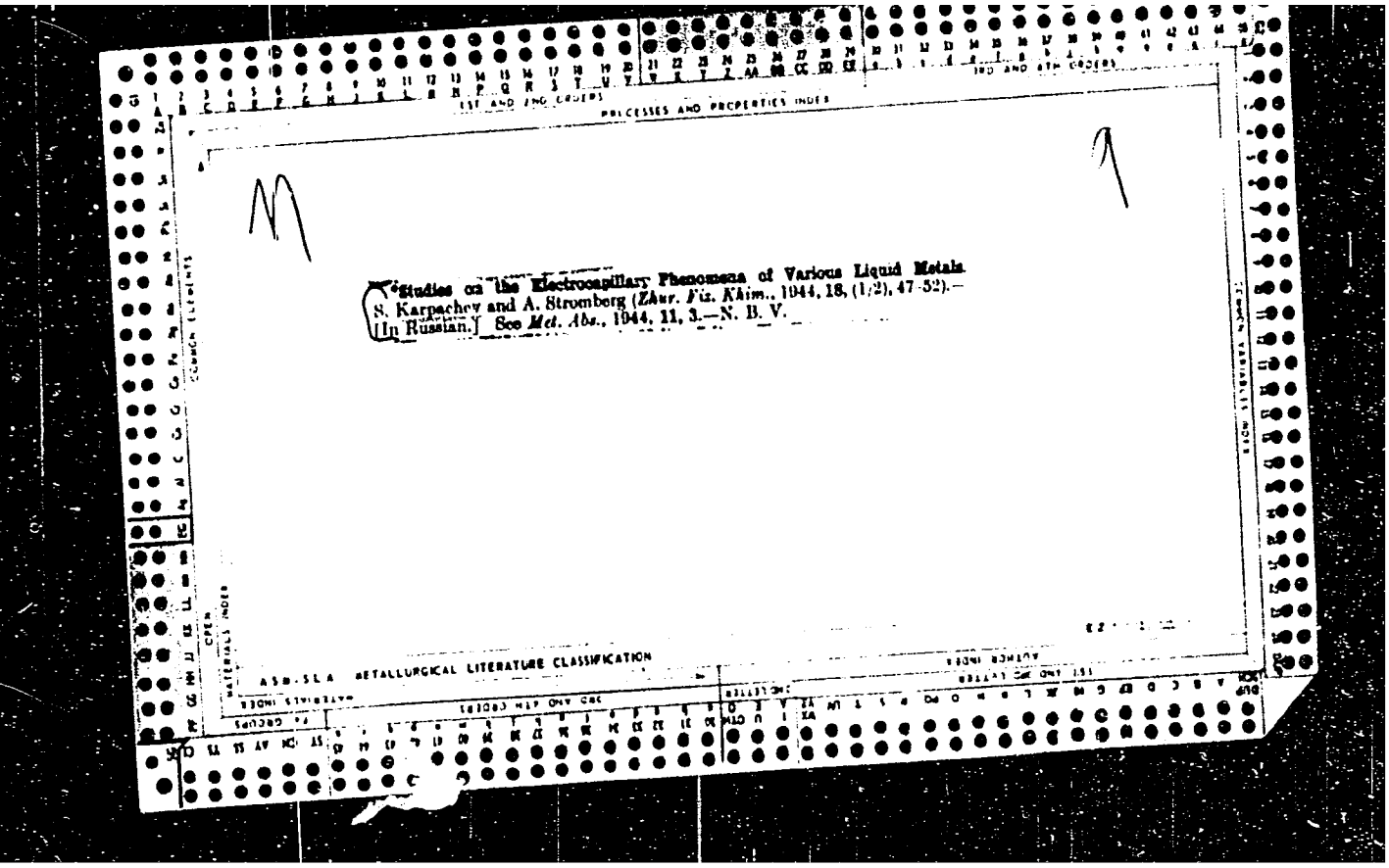
M

9

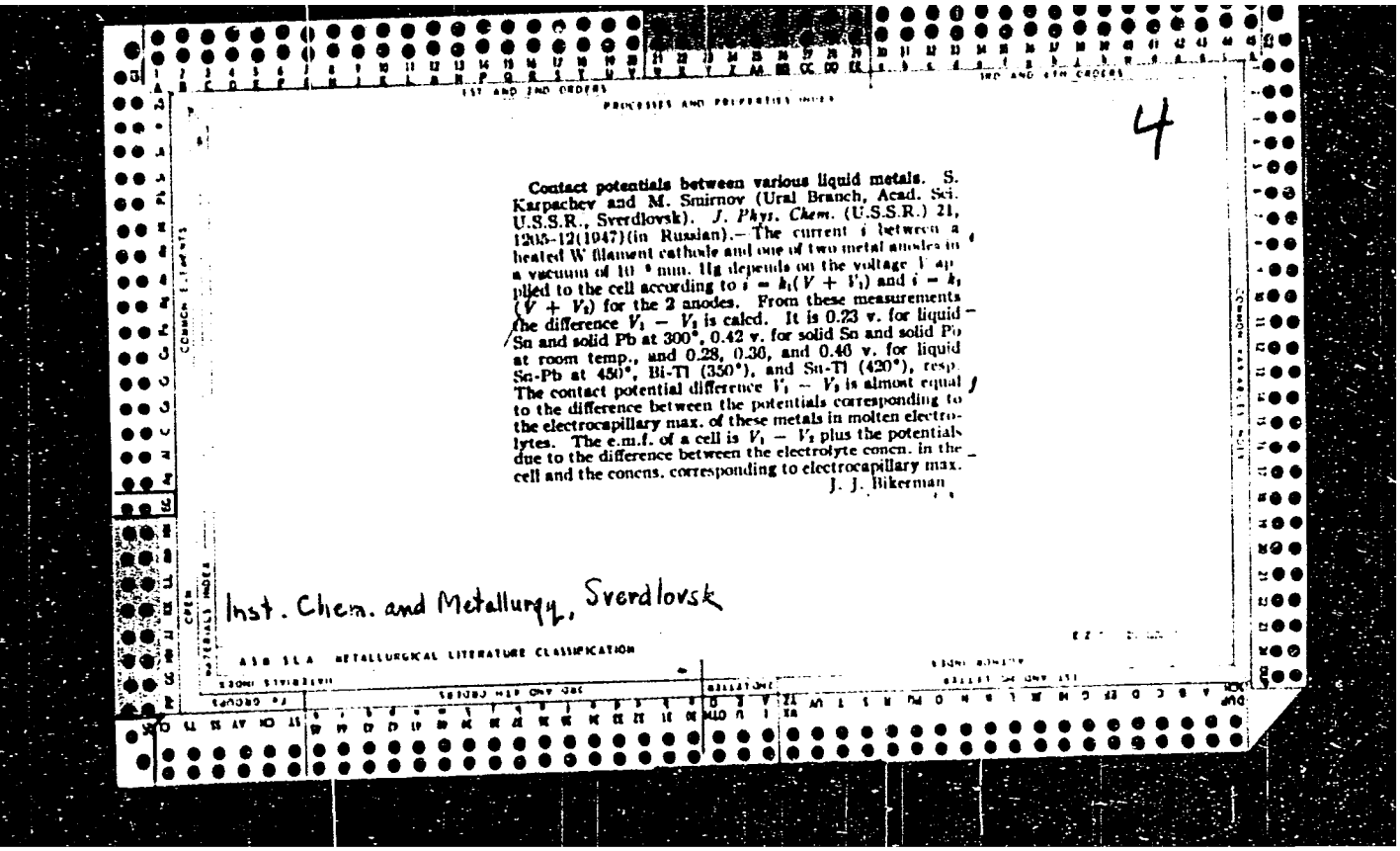
Measurement of the Capacity of the Secondary Electrical Layer on the Alloy Vuda. S. Karpachev, N. Ladygin, and V. Zykov (Zhur. Fiz. Khim., 1943, 17, (2), 75-79).-(In Russian.) A study was made of the capacity of the secondary layer on liquid and solid Vuda (bismuth 50.1, lead 24.9, tin 14.2, cadmium 10.8 wt.%; m.p. ~71°C) at various values of the electrocapillary potential. It is shown that in regions where the surface of the metal is negatively charged, the capacity is 15 and 20 μF./cm.^{2} on liquid and solid alloy, respectively. - N.P.V.

Chair Phys.Chem., Sverdlovsk State U. im. Gor'kiy

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



"Studies on the Electrocapillary Phenomena of Various Liquid Metals. S. Karpachev and A. Stromberg (Zhur. Fiz. Khim., 1944, 18, (1/2), 47-52).—[In Russian.] See *Met. Abs.*, 1944, 11, 3.—N. B. V.

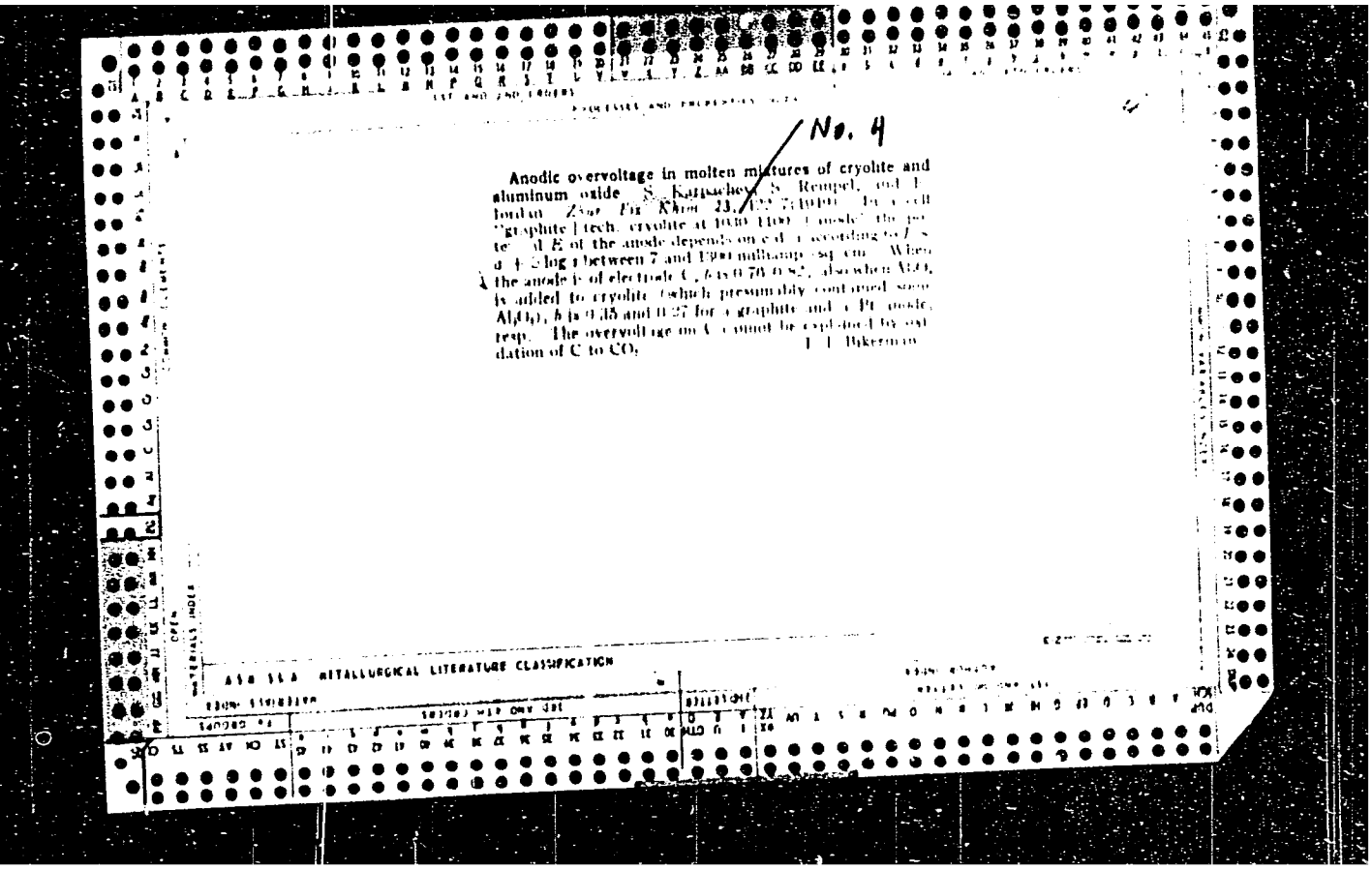


4

Contact potentials between various liquid metals. S. Karpachev and M. Smirnov (Ural Branch, Acad. Sci. U.S.S.R., Sverdlovsk). *J. Phys. Chem.* (U.S.S.R.) 21, 1305-12(1947)(in Russian).— The current i between a heated W filament cathode and one of two metal anodes in a vacuum of 10^{-6} mm. Hg depends on the voltage V applied to the cell according to $i = k_1(V + V_1)$ and $i = k_2(V + V_2)$ for the 2 anodes. From these measurements the difference $V_1 - V_2$ is calcd. It is 0.23 v. for liquid Sn and solid Pb at 300°, 0.42 v. for solid Sn and solid Pb at room temp., and 0.28, 0.36, and 0.46 v. for liquid Sn-Pb at 450°, Bi-Tl (350°), and Sn-Tl (420°), resp. The contact potential difference $V_1 - V_2$ is almost equal to the difference between the potentials corresponding to the electrocapillary max. of these metals in molten electrolytes. The e.m.f. of a cell is $V_1 - V_2$ plus the potentials due to the difference between the electrolyte concn. in the cell and the concns. corresponding to electrocapillary max.

J. J. Bikerman

Inst. Chem. and Metallurgy, Sverdlovsk



No. 4

Anodic overvoltage in molten mixtures of cryolite and aluminum oxide. S. Karpachev, S. Rempel, and I. Isodkin. *Zhur. Fiz. Khim.* 23, [illegible]. In a cell "graphite | tech. cryolite at 1000–1100° | anode," the potential E of the anode depends on d according to $E = a + b \log d$ between 7 and 1200 milliamp./sq. cm. When the anode is of electrode C, b is 0.70 ± 0.2, also when Al$_2$O$_3$ is added to cryolite (which presumably contained some Al$_2$O$_3$), b is 0.35 and 0.27 for a graphite and a Pt anode, resp. The overvoltage on C cannot be explained by oxidation of C to CO$_2$. I. I. Bykerman

A 54 54 A METALLURGICAL LITERATURE CLASSIFICATION

KARPACHEV, S. V.

67T22

USSR/Chemistry - Amalgams, Tin
Chemistry - Electrocapillarity

Apr 1948

"Research on the Electric Capillary Phenomenon in Amalgams of Tin and Bismuth," S.V. Karpachev, V.P. Kochergin, Ye.F. Iordan, Electrochem Lab, Ural Affiliate, Acad Sci USSR, Sverdlovsk, 6 pp

"Zhur Fiz Khim" Vol XXII, No 4 pp. 521-26

Electrocapillary phenomenon in amalgams of tin evidence minimum surface tension, while amalgams of bismuth evidence maximum surface tension. Conducted studies to determine the elasticity of mercury vapors on subject amalgams at temperatures of

[redacted] 67T22

USSR/Chemistry - Amalgams, Tin (Contd) Apr 1948

420°. Submitted 23 Jul 1947.

[redacted] 67T22

KARPACHEV, S.

Karpachev, S. and Pal'guev, S., Determination of the transfer numbers of cation and anion in pure melted salt. P. 942

The transfer numbers of the cation and anion in melted lead chloride are measured with and without a porous diaphragm. Values for the transfer numbers of the cations and anion were obtained in an interval of 0.1-0.2 and 0.9-0.8 respectively; that is, the mobility of the cation in melted lead chloride is much smaller than that of the anion.

Lab. of Electrochemistry
The Ural Branch of Acad. of Sci., USSR
Sept. 3, 1948

SO: Journal of Physical Chemistry (USSR) 23, No. 8 (1949)

USSR/Chemistry - Electrocapillarity
Tin Alloys

Aug 49

PA 67/49T12

"Research on the Electrocapillary Phenomena of Alloys of Tin With Gold and Bismuth With Tellurium," S. Karpachev, E. Rodigina, Lab of Electrochem, Inst of Chem and Metal, Sverdlovsk, Ural Affiliate, Acad Sci USSR, 5½ pp

"Zhur Fiz Khim" Vol XXIII, No 8 - p. 953

Research on both these types of alloys in the fluid state indicates a pronounced minimum of surface tension. Aided by the theory of A. Zhukhovitskiy, examined maximum and minimum surface tensions of binary metallic alloys with relation to common boundaries

67/49T12

[redacted]

USSR/Chemistry - Electrocapillarity (Contd) Aug 49

of the two components of the alloys and their saturated vapors. Positive and negative deviations in the behavior of alloys in contrast with ideal solutions predict maximum and minimum extremes, respectively. In the equation for the surface tensions of pure components, the extreme always lies at the molar fraction 0.5. Submitted 27 Sep 48.

67/49T12

[redacted]

KARPACHEV, S.

KARPACHEV, S.

PA 3/50T81

USSR/Physics - Contact Potential 11 Sep 49
Metals - Mercury

"Contact Potential Differences Between Liquid Mercury and Solid Lead and Thallium," S. Karpachev, M. Smirnov, Inst Phys of Metals, Ural Affiliate, Acad Sci USSR, 4 pp

"Dok Ak Nauk SSSR" Vol LXVIII, No 2

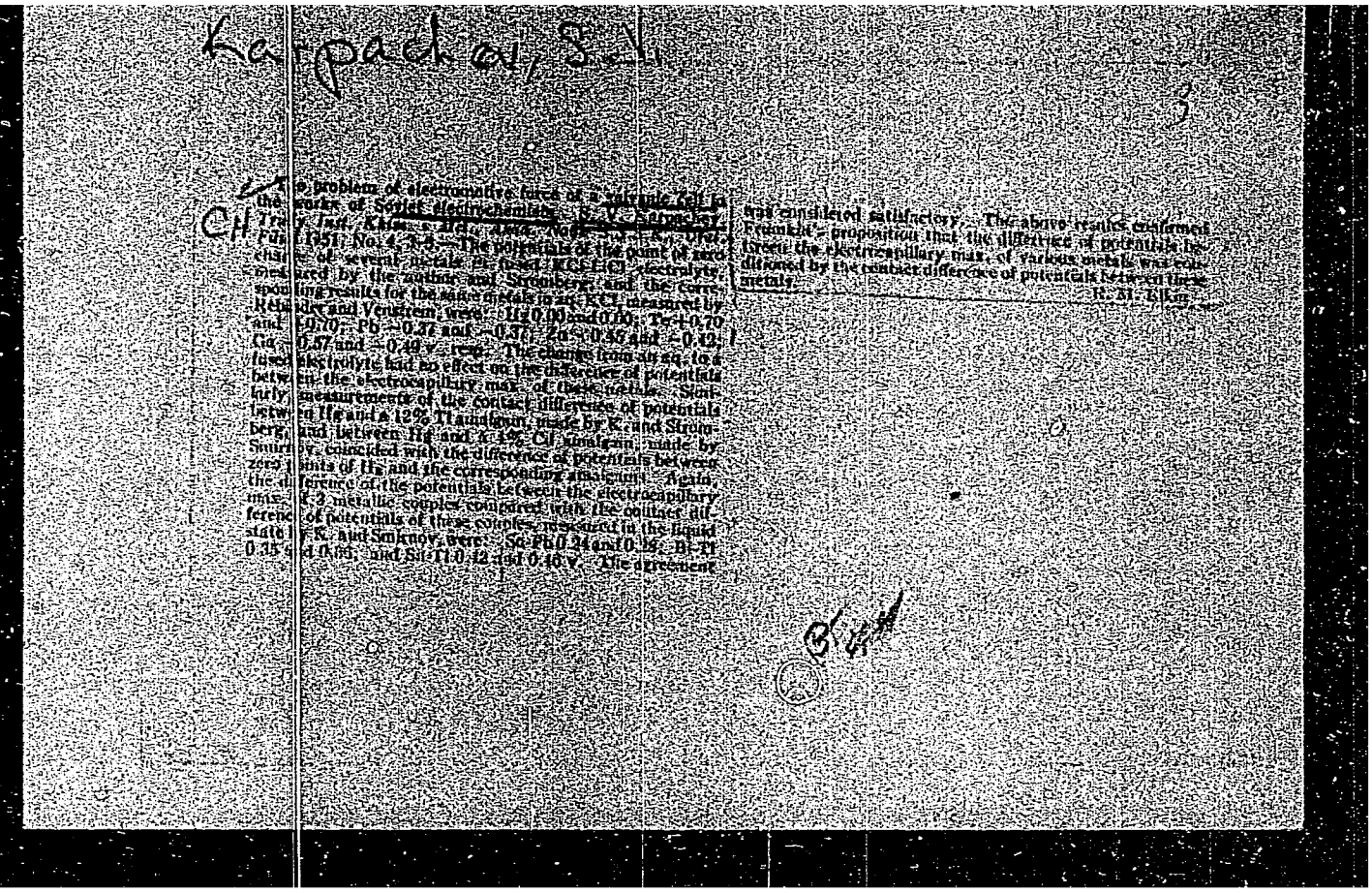
Obtained an average value of 0.447 volt, in three experiments, as the contact potential difference between liquid mercury and solid lead. This is very close to potential difference between points of zero charge of mercury and lead in water

3/50T81

USSR/Physics - Contact Potential (Contd) 11 Sep 49

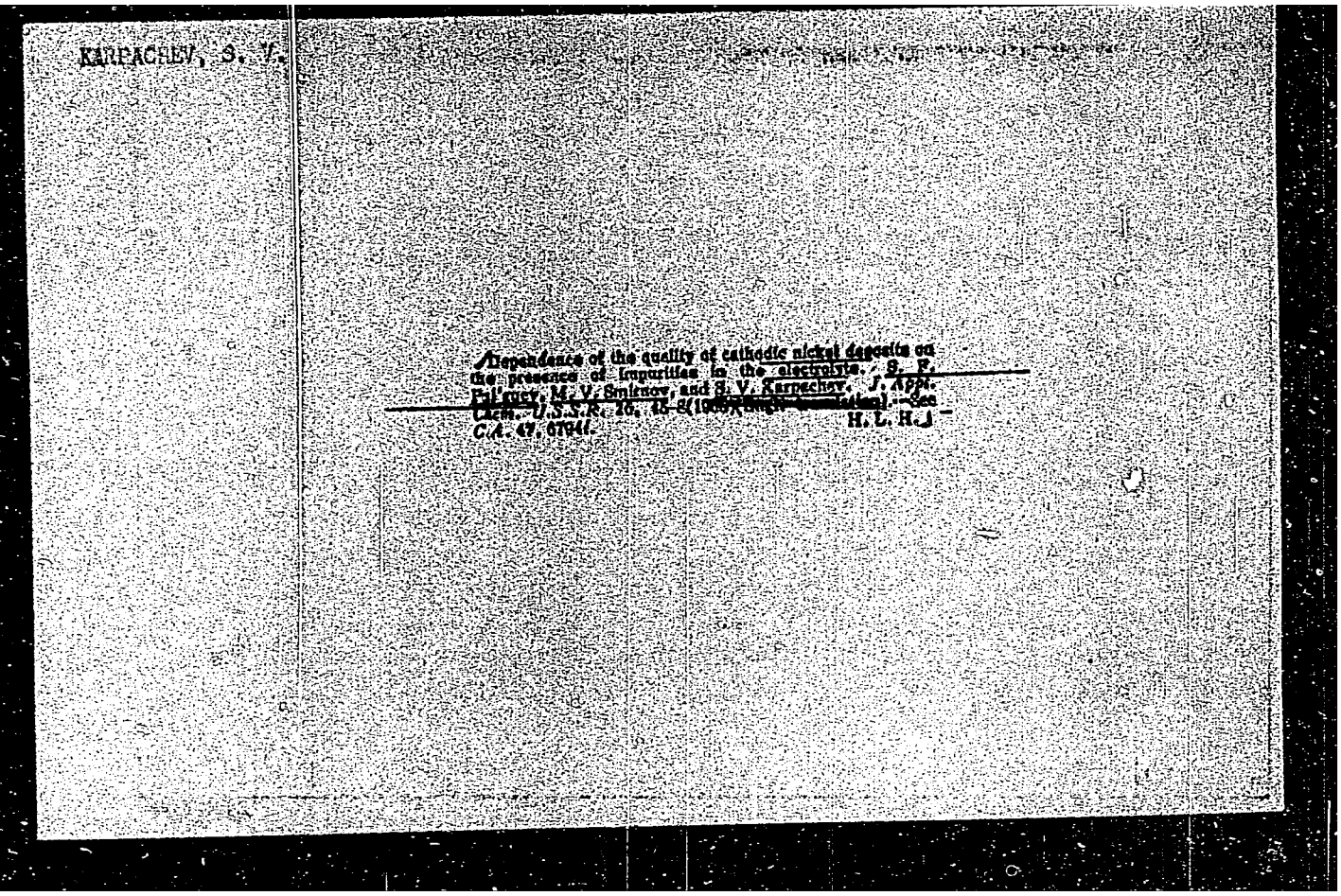
solutions. Obtained an average value of 0.533 volt for contact potential difference between liquid mercury and solid thallium, which is also fairly close to value (0.59 volt) for potential difference between points of zero charge of liquid mercury and solid thallium. Submitted by Acad A. N. Frumkin 8 Jul 49.

3/50T81



e problem of electromotive forces of a solvable salt in
works of Soviet electrochemists. [illegible]
Zhur. Khim. 1951, No. 4, 3-8.—The potentials of the point of zero
e of several metals in fused KCl-LiCl electrolyte,
ured by the authors and Stromberg, and the corre-
ponding results for the same metals in aq. KCl, measured by
dov and Vvedenski, were: Hg 0.00 and 0.00; Te +0.70
0.70; Pb −0.37 and −0.37; Zn −0.36 and −0.42; I
0.57 and −0.49 v., resp. The change from aq. to a
electrolyte had no effect on the difference of potentials
en the electrocapillary max. of these metals. Simi-
measurements of the contact differences of potentials
en Hg and a 12% Tl amalgam, made by K. and Strom-
and between Hg and a 4% Cd amalgam, made by
Smirnov, coincided with the difference of potentials between
zero points of Hg and the corresponding amalgam. Again,
the difference of the potentials between the electrocapillary
inim. of 3 metallic couples compared with the contact dif-
ference of potentials of these couples, measured in the liquid
state by K. and Smirnov, were: Sn-Pb 0.24 and 0.39; Bi-Tl
0.03; and Sn-Tl 0.42 and 0.46 v. The agreement
was considered satisfactory. The above results confirmed
Frumkin's proposition that the difference of potentials be-
tween the electrocapillary max. of various metals was con-
ditioned by the contact difference of potentials between these
metals.

H. M. Bikerman



KARPACHEV, S. V.

Dependence of the quality of cathodic nickel deposits on the presence of impurities in the electrolyte. S. P. Fil'kov, M. V. Smirnov, and S. V. Karpachev. *J. Appl. Chem. U.S.S.R.* 20, 45–8(1947). (English translation.)—See *C.A.* 47, 6794f. H. L. H. J.

USSR/Chemistry -- Electrochemistry Metallurgy KARPACHEV, S. V. Jan 53

"The Relationship between the Quality of Nickel Cathode Deposits and the Presence of Impurities in the Electrolyte," S. V. Pal'guyev, N. V. Smirnov, and S. V. Karpachev, Inst of Chemistry and Metallurgy, Ural Affiliate, Acad Sci USSR

Zhur Prik Khim, Vol 26, No 1, pp 59-64

Demonstrated the strong influence of the presence of oxygen or traces of moisture in the electrolyte on the nickel cathode deposit during electrolysis of molten chloride. Passing dry hydrogen chloride through the molten electrolyte freed the latter from the above impurities and improved the quality of the metallic cathode deposit.

(CA 47 no:14 :6794 '53)

€

2/PB

KARPACHEV, S.V.

Chemical Abst.
Vol. 48 No. 6
Mar. 25, 1954
Electrochemistry

(5) 9

The work function of mercury in an atmosphere of water vapor. S. V. Karpachev, K. V. Smirnov, Z. S. Volchenkova, and G. K. Stepanov (Inst. Chem. and Met., Ural Branch Acad. Sci. U.S.S.R., Sverdlovsk). Zhur. Fiz. Khim. 27, 1370–3(1953); cf. C.A. 48, 11068.—The work function of Hg in the presence of H_2O vapor (or this vapor and H) is greater than in vacuo as long as the adsorbed amt. of H_2O is less than 15×10^{-11} mole/sq. cm. At 10^{-10} mole/sq. cm. the difference has a max. (approx. 1.1 e.v.) which is too great to be accounted for by the orientation of adsorbed H_2O dipoles. The p.d. between Pt *in vacuo* and Pt in H_2O vapor (whose pressure varied from 5×10^{-6} to 2×10^{-4} mm. Hg) is independent of the vapor pressure and decreases from 0.47 v. at 150° to 0.1 v. at 350° and zero at 550°.

J. J. Bikerman

~~5(4)~~ 5.4600 SOV/20-129-6-39/69

AUTHORS: Pal'guyev, S. F., Karpachev, S. V., Yushina, L. D.

TITLE: An Electrochemical Chain With a Solid Electrolyte

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 6, pp 1339-1342 (USSR)

ABSTRACT: The authors investigated the temperature dependence of the electromotive force of the chain $Ag/AgBr_{solid}/Br,C$ in the region 25-421°. The electrochemical cell consisted of pressed silver bromide, to the one end of which a silver wire and to the other a carbon rod is attached. The entire cell was in a bromine atmosphere. Figure 1 gives the measured emf of the cell in dependence on temperature. The values between 110 and 421° lie on a straight line, for which an empirical equation is set up. Extrapolation to the melting point 434° of the AgBr gives an emf of 0.8033 v, which is in good agreement with the values given in reference 5 for liquid AgBr (0.8056 v), confirms the correctness of measurements, and points out that in solid AgBr electric conductivity near melting point has ionic character. The occurrence of electron conductivity in a bromine atmosphere is proven by the fact that the ion transfer number

Card 1/2

An Electrochemical Chain With a Solid Electrolyte SOV/20-129-6-39/69

for Ag^+ at 20° was between 0.03 and 0.05, and at 93° between 0.06 and 0.11, whereas that for Br^- was zero. On the basis of the thermodynamics of irreversible processes the concentration gradient of Br dissolved in solid AgBr and, thus, the gradient of the holes was calculated and the transfer number of the holes was found to be zero for the temperature interval of from 100 to 434°. The authors thank Academician A. N. Frumkin for the evaluation of their work. There are 1 figure and 8 references, 1 of which is Soviet.

ASSOCIATION: Institut elektrokhimii Ural'skogo filiala Akademii nauk SSSR (Institute of Electrochemistry of the Ural Branch of the Academy of Sciences, USSR)

PRESENTED: July 16, 1959, by A. N. Frumkin, Academician

SUBMITTED: July 15, 1959

S/631/60/000/001/009/014
B110/B102

AUTHORS: Karpachev, S. V., Vorob'yev, G. V.

TITLE: Electrical conductivity of molten alkali-metal carbonates. I. The system Na_2CO_3-K_2CO_3

SOURCE: Elektrokhimiya rasplavlennykh solevykh i tverdykh elektrolitov, no. 1, 1960, 61 - 64

TEXT: The authors studied the electrical conductivity of molten carbonates of the system Na_2CO_3-K_2CO_3 between 700 and 1000°C. The end of an alundum tube (inner diameter: ~0.4 cm; wall thickness: 0.15 - 0.20 cm) was provided with cylindrical Pt electrodes with a surface area of ~0.5 cm^2. 0.5-mm Pt wires were used for current supply. At an electrode spacing of 4.0 - 5.0 cm, a 40 - 50 cm^{-1} cell was obtained, which was set by screws to an immersion depth of the upper electrode of 0.5 cm. The measuring arrangement consisted of an a-c bridge and a cathode-ray oscilloscope which was used as zero indicator. The conductivity was measured between 1000 - 5000 cps. The results were extrapolated to infinite frequency;

Card 1/3

S/631/60/000/001/009/014
B110/B102

Electrical conductivity of...

$R = g(1/\sqrt{f})$ (R = resistance, f = a-c frequency) is linear. The alundum tube remained unchanged during 8-hr melting of Na_2CO_3 and K_2CO_3 at 900°C in a CO_2 atmosphere. The crucible with the alundum tube containing the melt was put into a metal block and then heated. The temperature was measured with a Pt-PtRh thermocouple. The temperature was kept constant with an accuracy of 1 - 2°C (measuring error, ± 3%). The temperature dependences of the electrical conductivities are straight lines which are almost parallel, since the temperature coefficients of the conductivity of pure, molten Na_2CO_3 and K_2CO_3 are similar. The curve of conductivity versus composition first ascends slowly when Na_2CO_3 is added (with 40 - 4% of Na_2CO_3 σ has changed only by 4% and then rapidly up to the value of pure Na_2CO_3. The dependence of equivalent conductivity on composition is more complex: on melting with 50 mole% of Na_2CO_3 a distinct minimum is observed. This indicates that the interaction between Na_2CO_3 and K_2CO_3 in melts reduces the conductivity and causes a density maximum at 45 mole%

Card 2/3

Electrical conductivity of...

of K_2CO_3. There are 2 figures and 7 references: 1 Soviet and 6 non-Soviet. The three references to English-language publications read as follows: E. Gorin, H. L. Recht. Amer. Soc. Mech. Engrs, 1958, A-200; A. Reisman. J. Amer. Chem. Soc., 81, 807, 1959; E. R. Van Artsdalen, J. S. Yaffe. J. Phys. Chem., 59, 118, 1955.

Card 3/3

KARPACHEV, S.V.; PAL'GUYEV, S.F.

Electromotive forces of electrochemical cells with solid electrolytes. Trudy Inst.elektrokhim.UFAN SSSR no.1:79-89 '60. (MIRA 15:2)

(Electromotive force)
(Electrolytes)

29413
S/081/61/000/017/013/166
B102/B138

24,2130 (1142, 1160, 1482)

AUTHORS: Karpachev, S. V., Pal'guyev, S. F.

TITLE: Electromotive forces of electrochemical circuits with solid electrolytes. II. Coexistence of n-type and p-type conductivity in the electrolyte

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 17, 1961, 67, abstract 176495 (Tr. In-ta elektrokhimii. Ural'skiy fil. AN SSSR, no. 1, 1960, 91-96)

TEXT: An expression is derived for the emf of a galvanic cell $A/A_{z_2}\,X_{z_1}/X,C,A$ (A - metal of valency z_1, X - metalloid of valency z_2, C - carbon electrode, A_{z_2}, X_{z_1} - salt or oxide) taking account of ionic, n-type, and p-type conductivity. It is shown that if n-type and p-type conductivity are due to dissolution of the metal or the metalloid in the solid electrolyte the emf of the circuits under consideration may, under certain conditions, be approximately the same as its thermodynamic value. [Abstracter's note: Complete translation.]

Card 1/1

29414

S/081/61/000/017/014/166
B102/B138

24,2130 (1142,1160,1482)

AUTHORS: Karpachev, S. V., Pal'guyev, S. F.

TITLE: Electromotive forces of circuits with solid electrolytes possessing electron besides ion conductivity

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 17, 1961, 67-68, abstract 17B496 (Tr. In-ta elektrokhimii. Ural'skiy fil. AN SSSR, no. 1, 1960, 97-100)

TEXT: The effect of n-type conductivity on emf is considered for the electrochemical circuit Br,C/AgBr(solid)/Ag as an example. It is shown that $E = E_0(1-t)$, where E is the total emf, E_0 the emf without n-type conductivity, and t the number of electron transitions into the electrolyte. The efficiency of this kind of cell is described by the ratio: $((1-\bar{t})/(1-t^{(Ag)}))100$, if the efficiency of a cell without n-type conductivity is taken as 100 %. When current is obtained from the element, the Br distribution along the electrolyte changes, and the efficiency increases. [Abstracter's note: Complete translation.]

Card 1/1

KARPACHEV, S.V.; PAL'GUYEV, S.F.

Functioning of a primary cell with a solid electrolyte having both ionic and electron conductivity. Trudy Inst. elektrokhim. UFAN SSSR no.1:101-103 '60. (MIRA 15:2)
(Electric conductivity)

PAL'GUYEV, S.F.; KARPACHEV, S.V.; YUSHINA, L.D.

Problem of measuring the decomposition voltage of solid electrolyte solutions. Trudy Inst.elektrokhim.UFAN SSSR no.1:105-110 '60. (MIRA 15:2)
(Solutions, Solid)
(Electromotive force)

S/076/60/034/05/22/038
B010/B002

AUTHORS: Karpachev, S. V., Karasik, E. M.

TITLE: On the Heats of Fusion of Some Inorganic Salts

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 5, pp. 1072-1076

TEXT: Proceeding from the concept of a salt melt as a crystal with a large number of lattice defects, the authors calculated the latent heat of fusion of some alkali halides (Table, results) by using Oriani's method of calculation (Ref. 4). The total change in entropy during the fusion process was represented as the sum from the change in entropy, caused by an increase in volume, and the change in entropy, caused by the increase in the degree of disorder on the fusion of the salt. The values of the latent heats of fusion calculated from this change in the entire entropy in the fusion process were compared with the corresponding experimental values taken from the manual by E. V. Britske, A. S. Kapustinskiy, and others (Ref. 11), and a satisfactory agreement was found (Table). Frenkel' is mentioned. There are 1 table and 12 references: 2 Soviet, 1 German, 6 American, 2 English, and 1 Japanese.

Card 1/2

On the Heats of Fusion of Some Inorganic Salts

S/076/60/034/05/22/038
B010/B002

ASSOCIATION: Ural'skiy gosudarstvennyy universitet im. A. M. Gor'kogo, Sverdlovsk
(Ural State University imeni A. M. Gor'kiy, Sverdlovsk)

SUBMITTED: July 19, 1958

Card 2/2

S/020/60/133/02/41/068
B004/B064

AUTHORS: Karpachev, S. V., Pal'guyev, S. F.

TITLE: On the Operation of a Voltaic Cell With a Solid Electrolyte Having a Mixed Conductivity

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 133, No. 2, pp. 396 - 398

TEXT: The authors investigated the effect upon the power of a voltaic cell of the electron conductivity of a solid electrolyte existing along with the ionic conductivity. The calculations were made from a sample cell with silver bromide as a solid electrolyte: Ag | AgBr | Br_2,C. The gaseous bromine should dissolve in AgBr and thus produce an electron conductivity of the p-type. On the condition that the bromine diffuses as far as the silver electrode and its concentration in the electrolyte is determined by the diffusion process only, the equations for the emf, the electron and hole transfer, the resistance of the electrolyte, and for the efficiency W_o without electron conductivity and for W with electron conductivity were derived (11). Equation (11) shows that in

Card 1/2

84832

S/020/60/134/005/020/023
B004/B064

24.7700 1143, 1138, 1395

AUTHORS: Pal'guyev, S. F., Karpachev, S. V., Neuymin, A. D., and Volchenkova, Z. S.

TITLE: Transition From Electron to Ion Conductivity as a Function of the Composition of Solid Solutions of Oxides

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 5, pp. 1138-1141

TEXT: The authors wanted to study the influence of calcium oxide upon the electrical conductivity of solid solutions of cerium and zirconium oxides. Since the solid solution $0.75CeO_2 \cdot 0.25ZrO_2$ has the highest conductivity (Ref. 1), it was used as initial substance. CaO was added in varying amounts; addition of CaO of up to 40 mole% resulted in the formation of solid solutions. The preparation of the samples was already described in Ref. 1. The relative electron and ion conductivities were determined by the solid electrolyte emf method at temperatures ranging from 500° to 1000°C, and herefrom the activation energy was computed. It was found that ion conductivity increases with an increase in tempera-

Card 1/4

Transition From Electron to Ion Conductivity as a Function of the Composition of Solid Solutions of Oxides

S/020/60/134/005/020/023
B004/B064

ture, reaching a maximum at 750°C. Only electron conductivity is found in the system CeO_2 - ZrO_2; the addition of CaO diminishes the total conductivity with a minimum at approximately 6 mole% CaO; the maximum is reached at 40 mole% CaO, when the conductivity is nearly 100% ionic and approximately equal to the electron conductivity of the CeO_2 - ZrO_2 system. The experiments were carried out with two electrolytic chains. a) $(Pt)O_{2\,p_1}$ | solid electrolyte | $O_{2\,p_2}(Pt)$. The cell of this chain is schematically shown in Fig. 1. The sample placed in a quartz tube between platinum electrodes was at both ends in contact with oxygen of different pressures (p_1 = 1.0, p_2 = 0.2 atm). b) Me', Me'(O) | solid electrolyte | | Me"(O), Me". This cell operated in vacuum without addition of gaseous oxygen. The partial pressure of O was determined from the dissociation pressure of the oxides (mixtures of Fe and FeO, Cu and Cu_2O), and ranged from 10^{-7} to 10^{-25} atm. The electron and ion conductivities were determined from $E = \left[1 - (\bar{t}_e + \bar{t}_o)\right] E_c$. E is the measured emf; $\bar{t}_e$, $\bar{t}_o$ the average

Card 2/4

Transition From Electron to Ion Conductivity as a Function of the Composition of Solid Solutions of Oxides

S/020/60/134/005/020/023
B004/B064

transference numbers of electrons and holes, respectively, E_o the thermodynamic value of the emf: $E_o = (RT/4F) \cdot \ln(P_2/P_1)$. Table 1 lists the experimental data. Fig. 2 shows conductivity and ΔE at 1000°C as a function of the CaO content. With rising CaO content in the system CeO_2 - ZrO_2 - CaO, the authors found a steady transition from electron to ion conductivity. This effect was not observed in the systems CeO_2 - CaO and ZrO_2 - CaO. The authors give the following explanation: As a result of partial reduction of Ce^{4+} to Ce^{3+}, first an intense electron conductivity occurs in the system CeO_2 - ZrO_2. Increasing addition of CaO inhibits this reduction more and more, and the ion conductivity caused by oxygen ions takes the place of electron conductivity. A decrease of conductivity in samples containing over 40 mole% CaO is attributed to the accumulation of free CaO not converted into a solid solution. There are 1 figure, 2 tables, and 9 references: 5 Soviet, 3 US, and 1 German.

Card 3/4

5.4700

40829

S/631/61/000/002/013/01·
1003/1203

AUTHORS Filyayev, A. T., Pal'guyev, S. F., and Karpachev, S. V.

TITLE Investigation of electrode polarization in solid electrolytes

SOURCE Akademiya nauk SSSR. Ural'skiy filial. Institut elektrokhimii. Trudy, no. 2. 1961, Elektrokhimiya rasplavlennykh solevykh i tverdykh elektrolitov. 199–209

TEXT: There are indications in the literature that the conductivity at elevated temperatures in a solid electrolyte consisting of 15 mole % CaO and 85 mole % of ZrO_2 is almost entirely ionic and supposedly due to the movement of oxygen ions. The polarization of the $CO + CO_2$ (Pt) |solid electrolyte 0.15 $CaO \cdot 0.85 ZrO_2$| O_2(Pt) cell was measured by a device containing a potentiometer or an oscilloscope. The oxygen electrode was used as the reference electrode, because it is not readily polarized. The relationship between the anodic polarization of the CO–CO_2 electrode and the polarizing current density is expressed by the equation $\mu = q + b \cdot \log i$, where $b \simeq 2.3 \cdot RT/F$ for both anodic and cathodic polarization. Oscillographic measurements show that, after the current is cut off, the polarization decreases so slowly that it can be correctly measured by means of an oscillograph. This is probable due to changes in concentrations caused by inhibition of diffusion or of chemical processes. There are 9 figures and 4 tables

Card 1/1

S/076/61/035/002/007/015
B124/B201

26.2520

AUTHORS: Yushina, L. D., Palguyev, S. F., and Karpachev, S. V.

TITLE: Study of electrochemical cells with solid electrolytes. I. Temperature dependence of the electromotive force of the cell Ag | AgBr(s) | Br_2, C

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 2, 1961, 342 - 349

TEXT: In the course of the work under consideration the authors measured the emf of the cell mentioned in the title in the range from room temperature to 421°C. The best results were obtained with a U-shaped glass tube, into whose one bend, which served as the cell proper, gaseous bromine was introduced and drawn off on the electrolyte surface. The contact with the bromine electrode in the tube was brought about by a soldered platinum wire. The bromine electrode used was a rodlet of spectrally pure carbon and the electrolyte a cylinder pressed from AgBr. The emf of the cell was measured with a high-resistance potentiometer of the type PPTB-1 (PPTV-1), equipped with an M-91/A (M-91/A) galvanometer as a zero

Card 1/5

Study of electrochemical cells ...

instrument. The measuring accuracy was ± 0.[illegible] mv at temperatures over 110°C, and about ± 1.0 mv at lower temperatures. Measurement results at different temperatures are illustrated in Fig. 1. In the temperature range from 110 to 421°C the points established experimentally were upon a straight line, whose equation was derived empirically with the aid of the least squares method: $E = (1.1518 - 0.495 \cdot 10^{-3}T) \pm 0.0017$ v (1); at temperatures lower than 110°C the points established experimentally were not on a straight line. According to Ref. 7 (E. J. Salstrom, J. H. Hildebrand, J. Amer. Chem. Soc. 52, 4650, 1930), the emf of the cell with liquid AgBr amounts to 0.8056 v at 434°C, while the one according to Eq. (1) is 0.8033 v. By thermodynamic calculations made on the basis of data by A. F. Kapustinskiy (Ref. 8: "Termicheskiye konstanty neorganicheskikh veshchestv" (thermal constants of inorganic substances) M. - L., 1949) 0.9904 v was found for the emf at 25°C, while .0049 v was obtained from Eq. (1). These data prove that there exists practically no

Card 2/5

Study of electrochemical cells ...

electron conductivity in AgBr in the temperature range from 420 to 100°C. To find out whether the electrical conductivity of solid AgBr was of an electronic nature, the authors measured the transfer numbers of the ions in solid AgBr in bromine (vapor pressure = 168 mm Hg) at room temperature and 93°C, the above described device being used for this purpose also. The electrolyte plates used were pressed by a special equipment between the carbon electrodes. The electrolysis current at 20°C was 0.5 to 1.2 ma and at 93°C it was 1.0 to 5.0 ma. The dissolution of bromine in solid AgBr causes an electron conductivity to appear. The electron conductivity arising in solid AgBr in connection with the bromine dissolution is caused by the motion of positively charged holes in the electric field. Ag- and Br ions and positively charged holes were found in solid AgBr. The mean value of the hole-transfer number is calculated from equation

$$t_o = \left(\int_{Br}^{Ag} t_o \, d\mu_{Br}\right)/(\mu_{Br}^{Ag} - \mu_{Br}^{Br}) \quad (11)$$

(where μ_{Br} denotes the potential of atomic bromine in bromine vapors around the Br-electrode, μ_{Br}^{Ag} and μ_{Br}^{Br} the chemical potential of atomic bromine, dissolved in the crystal around the

Card 3/5

Ag- and Br-electrode, respectively; t_o is proportional to the concentration of atomic bromine dissolved in AgBr: $t_o = kc_{Br}$. The relation $t_o = \left[k(c_{Br}^{Br} - c_{Br}^{Ag})\right] / \left[\ln(c_{Br}^{Br}/c_{Br}^{Ag})\right]$. The relation $t_o = t_o'/\ln(c_{Br}^{Br}/c_{Br}^{Ag})$ (12) is derived, where t_o' is the hole-transfer number in AgBr saturated with bromine at a bromine vapor pressure of 170 mm Hg, and c_{Br}^{Br} is the concentration of dissolved bromine in the immediate neighborhood of the Br electrode; $c_{Br}^{Br} \gg c_{Br}^{Ag}$. It may be stated in this connection that if the solid salt saturated with a metalloid practically exhibits only an electron conductivity, this will not become manifest at very low concentrations of dissolved solid metalloid salt near the metal electrode when measuring the emf; the same holds for dissolution in a solid metal salt.
There are 1 figure and 10 references: 2 Soviet-bloc and 8 non-Soviet-bloc. A reference to English language publications reads as follows:
D. L. Hildebrand, W. R. Kramer, R. A. Mac Donald, D. R. Still, J. Amer. Chem. Soc., 80, 4129, 1958.
ASSOCIATION: Institut elektrokhimii, Sverdlovsk
Card 4/5 (Institute of Electrochemistry, Sverdlovsk)

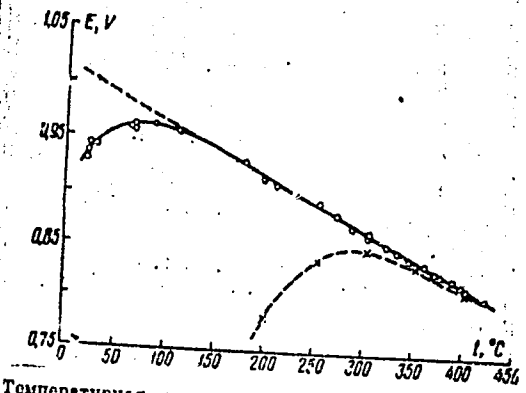
09573

S/076/61/035/002/007/015
B124/B201

Study of electrochemical cells ...

SUBMITTED: May 30, 1959

Legend to Fig. 1: Temperature dependence of the Ag|AgBr(sol)|Br_2, C cell; 1) data obtained from the present work; 2) data calculated on the basis of paper Ref. 3: C. Wagner, Z. phys. Chem., 32, 447, 1936.



Температурная зависимость цепи Ag|AgBr(тв) Br_2,C: *1* — данные настоящей работы; *2* — данные, рассчитанные на основании работы [3]

Card 5/5

Card 1/4

Polarization of some gas ...

which could become constant (measurement with a Pt-PtRh thermocouple). The resistance of the electrolyte was measured with an a-c bridge (3000 cps). At the experimental temperatures 900, 1000, and 1100°C, it was 23.90, 7.93, and 3.80 ohms, respectively. A linear relationship was found between current density and the voltage measured at the electrodes. The resistances of the electrolyte calculated from the slope of the straight line showed only slight divergences from the values measured directly. Accordingly, no overvoltage occurred at the O_2 electrode. Then, a Pt,O_2 electrode was exchanged for a Pt, $CO + CO_2$ electrode (cell II) which produced a noticeable emf, so that no external current source was necessary. Amperage was changed by means of a resistance box. The anodic polarization of the CO electrode around which a flow of 66 vol% of CO + 34 vol% of CO_2 streamed, was then measured. Pure oxygen streamed around the O_2 electrode. The anodic overvoltage was determined from $\eta = E_o - Ir - IR$ (1). η = absolute value of anodic overvoltage; E_o = equilibrium value of emf; I = amperage; r = resistance of electrolyte; IR = potential drop in the external circuit. For all of the three temperatures, the linear function $\eta = a + b \log i$ (2) was found (i ... pressed in a/cm^2). Since two electrons participate in the anodic ...

Card 2/4

Polarization of some gas ...

of the CO electrode, $b = 2.3RT/2F\alpha$ is written. For a, b, α the following values are given:

	900°C	1000°C	1100°C
b	0.258	0.250	0.260
α	0.45	0.51	0.52
a	1.068	0.953	0.866

At low amperages, the measurement values deviated considerably from linearity. This was ascribed to the polarization countercurrent. The following equations are written:

$\vec{i} = K \exp(\eta F/RT)$ (3); $\overleftarrow{i} = K \exp(-\eta F/RT)$ (4); $\vec{i} = i + \overleftarrow{i}$ (5).

At high overvoltage, $\vec{i} \simeq i$, at low overvoltage Eq. (5) is valid. i is the current measured. By using Eq. (4), $\overleftarrow{i}$ was calculated for the measuring points deviating from linearity at low overvoltage, and, by taking $\vec{i}$ into account, complete linearity could be achieved also for these measuring points. At the CO electrode, a considerable overvoltage (η = 0.6 v) occurred. Thus, the electrodic reaction is inhibited in spite of the high temperature. Further studies are necessary to explain this effect. There

Card 3/4

KARPACHEV, S.V.; FILYAYEV, A.T.; PAL'GUYEV, S.F.

Anodic polarization in solid electrolytes. Trudy Inst. elektrokhim. UFAN SSSR no.3:161-164 '62. (MIRA 16:6)

(Electrolytes) (Polarization (Electricity))

FILIAYEV, A.T.; KARPACHEV, S.V.; PAL'GUYEV, S.F.

Capacitance of a double electric layer in solid electrolytes.
Dokl. AN SSSR 149 no.4:909-910 Ap '63. (MIRA 16:3)

1. Institut elektrokhimii Ural'skogo filiala AN SSSR. Predstavleno akademikom A.N.Frumkinym.
(Fused salts—Electric properties)

KARPACHEV, S. V.; FILYAYEV, A. T.; PALGUYEV, S. F.

"Polarization of Oxygen Platinum Electrodes in a 0.85 ZrO_2 0.15 CaO Solid Electrolyte."

Report presented at the 14th meeting CITCE, Intl. Comm. of Electrochemical Thermodynamics and Kinetics, Moscow, 19-25 Aug 63.

Ural Institute of Electrochemistry, Academy of Sciences of U.S.S.R.

L 48970-65 EWT(m)/EWG(m)/T RWH

ACCESSION NR: AP5007751 S/0364/65/001/001/0090/0093

AUTHOR: Perfil'yev, M. V.; Pal'guyev, S. F.; Karpachev, S. V.

TITLE: Impedance of the electrode-electrolyte interface and the double layer capacity in solid electrolytes

SOURCE: Elektrokhimiya, v. 1, no. 1, 1965, 90-93

TOPIC TAGS: electrode, electrolyte, platinum, impedance

ABSTRACT: The alternating current method of studying aqueous and fused electrolytes was used to investigate the electrode processes in solid electrolytes. Cells of the type Pt, O_2|solid electrolyte|O_2, Pt were used in the 700-800°C temperature range. The electrolyte was a solid solution of 0.15 $CaO \cdot 0.85CeO_2$. This was made in the form of a cylinder with pointed conical depressions at the ends. The operating electrode was platinum applied as powder on the surface of the central cylinder. An auxiliary electrode was applied on the external surface of the cylinder. Prior to the measurements the electrode was treated with a current having a density of not less than 0.5 a/cm^2. A bridge was used for the measurements which made it possible to perform measurements in a frequency range of from 20 cycles to 20 kilo-

Card 1/2

L 48970-65
ACCESSION NR: AP5007751

cycles with a voltage amplitude in the cell of 20 millivolts. The resistance of the electrolyte was measured with a cathode oscillograph. The resistance was 35-40 Ω and the accuracy of measurement was on the order of 1-2 Ω. All measurements were made at the equilibrium potential of the oxygen electrode being investigated. The results of the measurements are shown in table 1 of the Enclosure where $\Delta\varphi$ is in millivolts and C is in $\mu f/cm^2$. Orig. art. has: 2 figures, 1 table, 4 equations.

ASSOCIATION: Institut elektrokhimii Ural'skogo filiala Akademii nauk SSSR (Institute of Electrochemistry, Ural Branch, Academy of Sciences SSSR)

SUBMITTED: 01Sep64 ENCL: 01 SUB CODE: GC, IC

NO REF SOV: 008 OTHER: 003

Card 2/3

L 4982-66 EWP(e)/EPA(s)-2/EWT(m)/EPF(c)/EWP(i)/EPF(n)-2/EPA(w)-2/EWP(t)/EWP(b) IJP(c) JD/WW/JG/WH

ACC NR: AP5025351 SOURCE CODE: UR/0131/65/000/010/0040/0042

AUTHOR: Ovchinnikov, Yu. M.; Karpachev, S. V.; Neuymin, A. D.; Pal'guyev, S. F.

ORG: Institute of Electrochemistry, Urals Branch, AN SSSR (Institut elektrokhimii UFAN SSSR)

TITLE: Penetration of oxygen in ceramics having a zirconium dioxide base

SOURCE: Ogneupory, no. 10, 1965, 40-42

TOPIC TAGS: ceramic product, gas diffusion, oxygen, carbon monoxide, argon, titanium

ABSTRACT: The authors describe an experiment of oxygen diffusion through ceramics having a composition of 0.85 ZrO_2 0.15 CaO, in the temperature range of 600-900°C. The flow of oxygen that diffused through the walls of the test tubes was measured with argon and titanium. A test was also carried out to determine the penetration of carbon monoxide at a temperature of 900°C. It was less than $4 \cdot 10^{-9}$ cm/sec.

Card 1/2 UDC: 661.883

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L 4982-66

ACC NR: AP5025351

The ceramics tested proved to be practically impenetrable to carbon monoxide, and oxygen diffused directly through the ceramic body and not through the pores. This work was based on the experiments of Kingery W. D., Pappis J., Doty M. E., Hill D. C. Journ. Amer. Cer. Soc., 1959, v. 42, no. 8, p. 393. Orig. art. has: 3 figures and 1 table.

SUB CODE: MT,GC SUBM DATE: 00/ NR REF SOV: 001/ OTHER: 002

Card 2/2

OVCHINNIKOV, Yu.M.; KARPACHEV, S.V.; PAL'GUYEV, S.F.; ZHDANOVA, G.M.; NEUYMIN, A.D.

Kinetics of the reduction by carbon monoxide of solid solutions based on cerium dioxide. Elektrokhimiia 1 no.10:1196-1201 O '65. (MIRA 18:10)

1. Institut elektrokhimii Ural'skogo filiala AN SSSR.

VOROB'YEV, G.V.; PAL'GUYEV, S.F.; KARPACHEV, S.V.

Viscosity of molten alkali metal carbonates. Trudy Inst. elektrokhim. UFAN SSSR no.6:39-43 '65. (MIRA 18:21)

OVCHINNIKOV, Yu.M.; KARPACHEV, S.V.; NEUYMIN, A.D.; PAL'GUYEV, S.F.

Oxygen permeability of ceramics on a ZrO_2 base. Ogneupory 30 no.10:40-43 '65. (MIRA 18:10)

1. Institut elektrokhimii Ural'skogo filiala AN SSSR.

L 30219-66 EWT(m)/ETC(f)/T/EWP(t)/ETI IJP(c) DS/AW/JD/JG

ACC NR: AP6015014 (A) SOURCE CODE: UR/0364/66/002/005/0617/0619

40
B

AUTHOR: Karpachev, S. V.; Filyayev, A. T.

ORG: Institute of Electrochemistry, Ural Affiliate, Academy of Sciences SSSR, Sverdlovsk (Institut elektrokhimii Ural'skogo filiala Akademii nauk SSSR)

TITLE: Some specific features of the behavior of gas electrodes in contact with a solid electrolyte

SOURCE: Elektrokhimiya, v. 2, no. 5, 1966, 617-619

TOPIC TAGS: zirconium compound, calcium oxide, solid solution, electrolyte, platinum, electrode potential, cathode polarization

ABSTRACT: The authors measured the capacity of the electric double layer in the solid solution $0.85ZrO_2 \cdot 0.15CaO$ in order to refine the data obtained earlier and to use the method of capacity measurement for studying the behavior of gas electrodes in contact with a solid electrolyte. Platinum electrodes were employed and the capacity and resistance of the electric double layer were measured (at a frequency of 100 Kc) as functions of the electrode potential. Pretreatment of the electrode with anodic current decreased the electrode capacity. This is attributed to a decrease in the contact area between the electrolyte and the electrode, caused by the disrupting action of the oxygen escaping from the electrode, as indicated by a rise of the ohmic resistance and

UDC: 541.135.4

Card 1/2

L 30219-66
ACC NR: AP6015014

drop of the anodic polarization of the electrode following the pretreatment. A substantially weaker effect in the range of high cathodic polarizations may be due to the appearance of electron conduction. The data indicate that a compact platinum electrode does not have a constant working surface. The capacity values obtained are not absolute, since the true area of contact between the electrode and the electrolyte is not known. Orig. art. has: 2 figures.

SUB CODE: 07/ SUBM DATE: 19Feb65/ ORIG REF: 006

Card 2/2

L 38369-66 EWT(m)/T DS

ACC NR: AT6021374 (A) SOURCE CODE: UR/2631/65/000/007/0169/0174

AUTHOR: Filyayev, A. T.; Karpachev, S. V.; Pal'guyev, S. F.

ORG: none

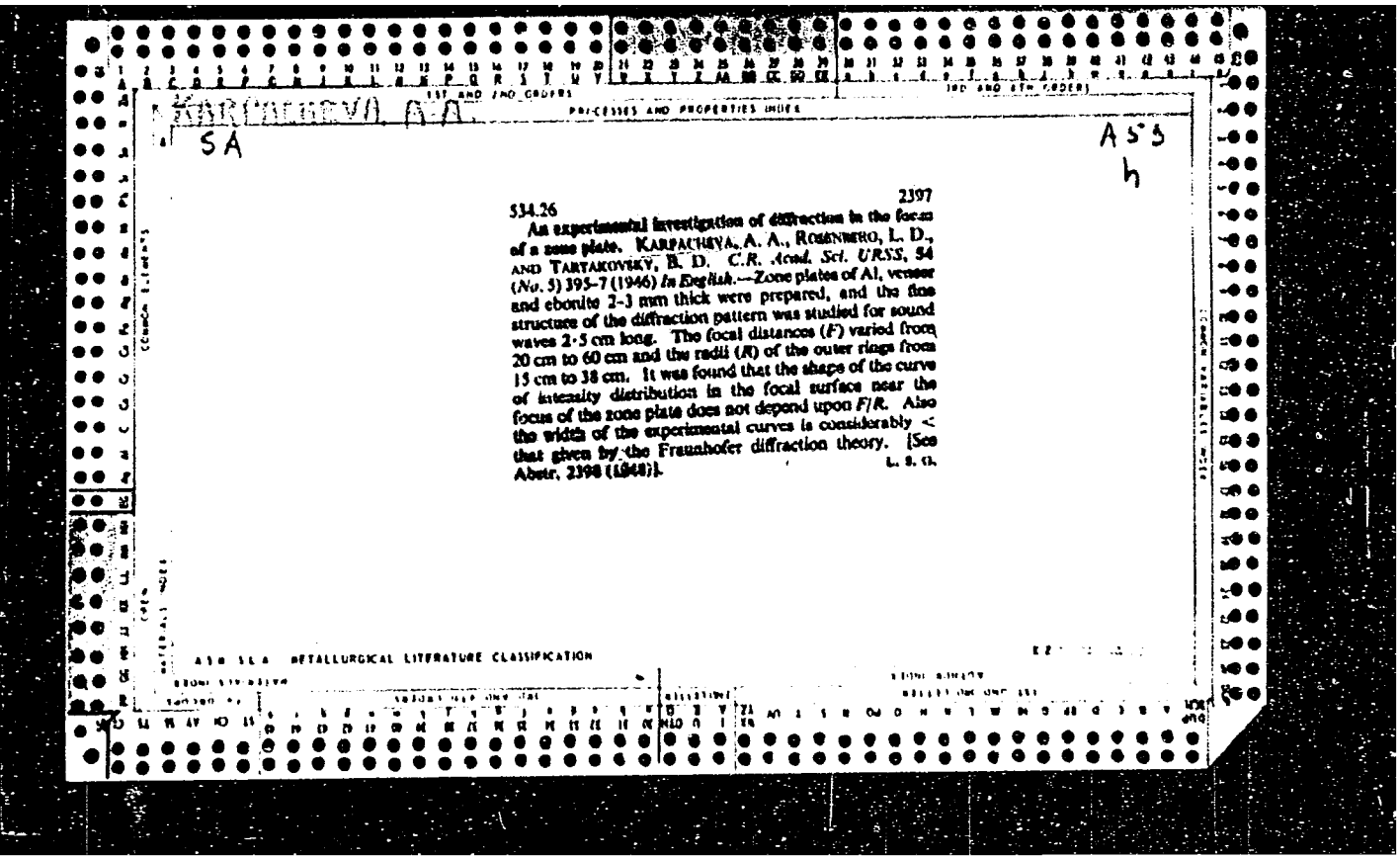
TITLE: Study of the polarization of the oxygen electrode in a solid electrolyte

SOURCE: AN SSSR. Ural'skiy filial. Institut elektrokhimii. Trudy, no. 7, 1965. Elektrokhimiya rasplavlennykh solevykh i tverdykh elektrolitov; termodinamika i kinetika elektrodnykh protsessov (Electrochemistry of fused salts and solid electrolytes; thermodynamics and kinetics of electrode processes), 169-174

TOPIC TAGS: electric polarization, oxygen, platinum, zirconium compound, calcium compound, electric impedance, electrode

ABSTRACT: Continuing their investigation of electrode polarization in solid electrolytes, the authors studied the polarization of the platinum oxygen electrode as a function of current density in the solid solution $0.85ZrO_2 \cdot 0.15CaO$. The anodic polarization was determined from oscillograms of the electrode potential drop with time after the polarizing current was switched off. At relatively low polarizations, the current dependence of the polarization obeyed Tafel's equation, $\Delta\phi = a + b \log i$, where $b = 1.3 \frac{2.3\,RT}{2F}$. It is shown that this value of the coefficient is compatible with the slow discharge theory. The impedance of the electrode - electrolyte inter-

Card 1/2



KARPACHEVA, A.A.

PROCESSES AND PROPERTIES INDEX

SA

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2397

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An experimental investigation of diffraction in the focus of a zone plate. KARPACHEVA, A. A., ROSENBERG, L. D., AND TARTAKOVSKY, B. D. *C.R. Acad. Sci. URSS*, 54 (*No.* 5) 395–7 (1946) *In English.*—Zone plates of Al, veneer and ebonite 2–3 mm thick were prepared, and the fine structure of the diffraction pattern was studied for sound waves 2·5 cm long. The focal distances (*F*) varied from 20 cm to 60 cm and the radii (*R*) of the outer rings from 15 cm to 38 cm. It was found that the shape of the curve of intensity distribution in the focal surface near the focus of the zone plate does not depend upon *F*/*R*. Also the width of the experimental curves is considerably < that given by the Fraunhofer diffraction theory. [See Abstr. 2398 (1948).] L. S. G.

A1a S1.a METALLURGICAL LITERATURE CLASSIFICATION

DAVYDOV, B.E.; KARAPETYAN, R.Z.; KARPACHEVA, G.P.; KRENTSEL', B.A.; LAPITSKIY, G.A.; KHUTAREVA, G.V.

Disarrangement of complanarity and conjugation in crystal-forming polymers. Dokl. AN SSSR 160 no.3:650-653 Ja '65. (MIRA 18:3)

1. Institut neftekhimicheskogo sinteza im. A.V. Topchiyeva AN SSSR. Submitted July 14, 1964.

24700

S/056/62/043/002/002/053
B102/B104

AUTHORS: Volkov, D. I., Pshenichkin, P. A., Karpacheva, G. P.

TITLE: Temperature dependence of the magnetic susceptibility of manganese-copper alloys

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 2(8), 1962, 370 - 375

TEXT: The magnetic properties of Cu-Mn alloys show peculiarities, the causes of which have so far not been fully clarified. The authors studied χ (T) between 77 and 1250°K for Mn concentrations from 5.76 - 91.2 at%. Measurements were made by the weighing method. The alloys were fused in an evacuated h-f furnace. At low temperatures, all alloys show an antiferromagnetic transtition (Neel point Θ_N); Θ_N lies the deeper, the lower the Mn content; from 50% Mn upward, it remains constant at about 150°K. The course of the curves χ^{-1}(T) showing a minimum at Θ_N depends on the Mn content: up to 17%, they are linear between Θ_N and the melting point,

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Temperature dependence of the ...

as from 22,5 between Θ_N and room temperature. They show a salient point at room temperature, and go on linearly up to the melting point. The inclination of these straight lines is the greater, the higher the Mn concentration. Resistivity maxima occur at these critical temperatures. Alloys containing 82.5 and 91.2 at% Mn show an abnormal behavior of χ (T): χ grows with the temperature. The experimental results can be explained by assuming that conduction electrons participate in the exchange interaction. There are 5 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: January 8, 1962

Card 2/2

L 16034-65 EWT(m)/EPF(c)/EWP(j)/T Pc-4/Pr-4 AFWL/SSD/ASD(m)-3/AS(mp)-2/AFETR/
ACCESSION NR: AP4045800 RAEM(a)/ESD(t)S/0062/64/000/009/1697/1700
RAEM(c) RM

AUTHORS: Nasirov, F.M; Karpacheva, G.P.; Davy*dov, B.E.; Krentsel', B.A.

TITLE: Structure of the soluble complex organometallic catalyst for acetylene polymerization

SOURCE: AN SSSR. Izv. Seriya khimicheskaya, no. 9, 1964, 1697-1700

TOPIC TAGS: acetylene polymerization catalyst, complex organometallic catalyst, structure, chemical behavior, triethylaluminum, vanadium acetylacetonate, triethylaluminum vanadium acetylacetonate catalyst, tetravalent vanadium, divalent vanadium, magnetic susceptibility, EPR spectrum, magnetic moment, g-factor

ABSTRACT: The structure and the chemical nature of the active centers of the acetylene polymerization catalyst complex formed by reaction of triethylaluminum with vanadium acetylacetonate were examined. The catalyst, prepared by mixing $VC_{10}H_{14}O_5$ with a fourfold excess of $Al(C_2H_5)_3$ in benzene at room temperature, appeared homogeneous. It was proposed that the formation of the active catalytic complex took place according to the reaction shown in the

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L 16034-65
ACCESSION NR: AP4045800

enclosure in which the tetravalent vanadium was reduced to the divalent. The magnetic susceptibility and the EPR spectra of the vanadium acetylacetonate and of the complex were examined. The magnetic moment for $VC_{10}H_{14}O_5$, determined from the reverse molar magnetic susceptibility-temperature (120-300K range) relationship, was 1.67 ; for the complex, 3.83 . Similar values for magnetic moment were calculated from g-factors obtained from EPR spectral date, confirming divalency of the vanadium in the complex. Orig. art. has: 3 figures and 2 equations.

ASSOCIATION: Institut neftekhimicheskogo sinteza im. A.V. Topchiyeva Akademii nauk SSSR (Institute of Petrochemical Synthesis Academy of Sciences SSSR)

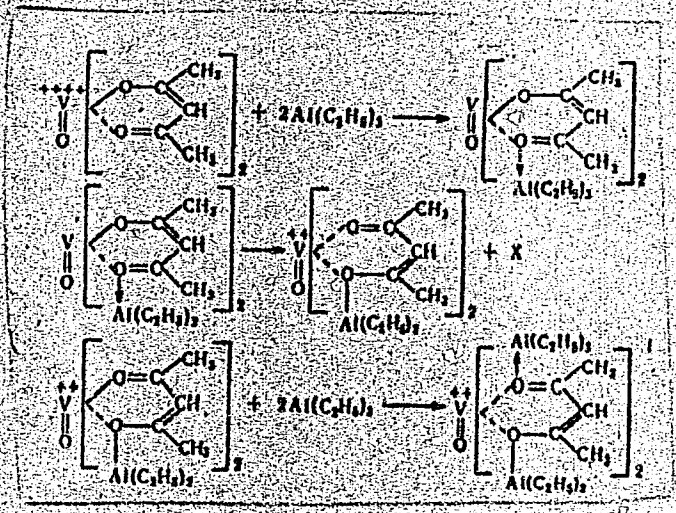
SUBMITTED: 27Jan64 ENCL: 01

SUB CODE: GC NR REF SOV: 002 OTHER: 004

Card 2/3

L 16034-65
ACCESSION NR: AP4045800

ENCLOSURE: 01



Card 3/3

L 54617-65 EPA(s)-2/EWI(m)/EPF(c)/EWP(j)/T/EWA(c) Pc-4/Pr-4/Pt-7 RPL
RM

ACCESSION NR: AP5006423 S/0062/65/000/001/0190/0192

AUTHOR: Karpacheva, G. P.

TITLE: Investigation of systems of Schiff polybasic compounds and certain halides with charge transfer

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 1, 1965, 190-192

TOPIC TAGS: paramagnetic resonance, polymer, glyoxal, charge transfer, polycondensation

ABSTRACT: Magnetic and electrical properties were studied in systems where the electron donor is the molecule of a polymer which belongs to the class of Schiff polybasic compounds, and the electron acceptors are bromine and iodine. The material used in this study was the product of polycondensation of glyoxal with 2,6-diaminopyridine, with a molecular mass of 800. Complexes with donor-to-acceptor ratios of 1:0.4, 1:0.95, 1:4.5, 1:2, 1:3.3, 1:5 and 1:8.7 were studied. The intensity of the paramagnetic resonance signal, the resistivity, and conductance activation energy are each shown as a function of the bromine content in fig. 1 of the Enclosure. The resistivity is shown as a function of temperature

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L 54617-65
ACCESSION NR: AP5006423

for each of the molar ratios in fig. 2 of the Enclosure. The identical nature of the variation in the three parameters (ρ, I, ΔF) and the coincidence of the extrema on the curves for the relationship between these parameters and the composition of the complex indicate that the nature of electrical conductivity and paramagnetism is the same and is associated with the formation of a complex with charge transfer. "In conclusion I consider it my duty to express my gratitude to D. A. Blyumenfel'd, B. E. Davydov and B. A. Krentsel' for their constant interest in the work." Orig. art. has: 2 figures.

ASSOCIATION: Institut neftekhimicheskogo sinteza im. A. V. Topchiyeva Akademii nauk SSSR (Institute of Petrochemical Synthesis, Academy of Sciences SSSR)

SUBMITTED: 03Jun64 ENCL: 02 SUB CODE: GC, EM

NO REF SOV: 005 OTHER: 003

Card 2/4

L 54617-65
ACCESSION NR: AP5006423
ENCLOSURE: 01

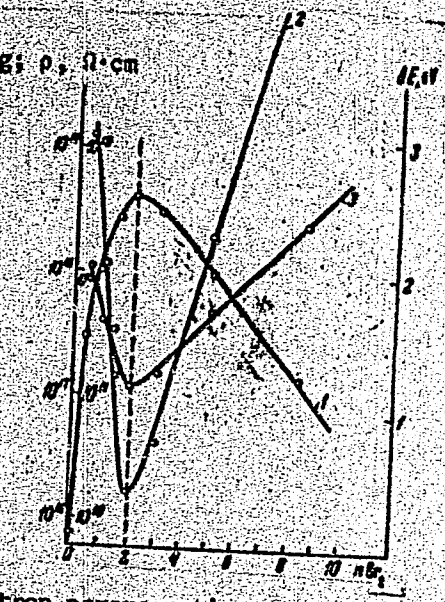

Fig. 1. Intensity of electron paramagnetic resonance signal (1), resistivity (2) and conductance activation energy (3) in relationship to bromine content. (The figures along the x-axis indicate the number of Br_2 molecules per molecule of polymer)

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L 54617-65

ACCESSION NR: AP5006423

ENCLOSURE: 02

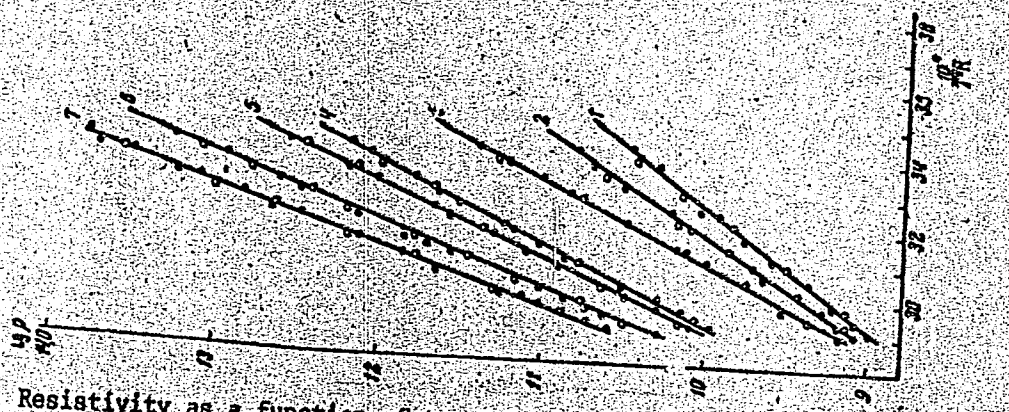

Fig. 2. Resistivity as a function of temperature in Schiff polybasic compound--bromine complexes with charge transfer. Molar ratios: *1*--1:2, *2*--1:3.3; *3*--1:1.5; *4*--1:0.95; *5*--1:5; *6*--1:0.4; *7*--1:8.7

Card 4/4

L 29134-65 EPA(s)-2/EWT(m)/EPF(c)/ENP(j)/T Pc-4/Pr-4/Pt-10 RM

ACCESSION NR: AP5005899 S/0020/65/160/003/0650/0653

AUTHOR: Davydov, B. E.; Zakharyan, R. Z.; Karpacheva, G. P.; Krentsel', B. A.; Lapitskiy, G. A.; Khutareva, G. V.

TITLE: Impairment of coplanarity and conjugation in crystallizing polymers

SOURCE: AN SSSR. Doklady, v. 160, no. 3, 1965, 650-653

TOPIC TAGS: crystallization, conjugation, conjugated polymer, organic semiconductor, semiconducting polymer, coplanarity

ABSTRACT: A study has been made to determine to what extent crystallization gives rise to conjugation disruption due to impairment of coplanarity in conjugated polymers in the solid phase, and how it affects their optical, paramagnetic, and semiconducting properties. These properties were compared for 32 polyazines and polymeric Schiff bases. It was found that the properties which are typical of conjugated polymers are exhibited to a greater extent by amorphous than by crystalline polymers. Thus, in color, in IR spectra, and in the absence of EPR, crystalline polyazines are similar to their analogs containing O, S, CH_2, or OCH_2 groups between conjugated segments in the backbone. A similar correlation, but less marked, was in evidence for the polymeric Schiff bases. This effect of crystallinity on con-

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L 29134-65

ACCESSION NR: AP5005899

jugated-polymer properties was attributed to the impairment of coplanarity during crystallization. In thermal stability and activation energy for conduction, however, the crystalline polymers were closer to the amorphous ones. The effect of crystallinity on semiconducting properties was interpreted as being determined in each individual case by changes in activation energy due to two competing processes occurring on crystallization: an increase in carrier mobility and a decrease in carrier concentration. Orig. art. has: 1 table. [SM]

ASSOCIATION: Institut neftekhimicheskogo sinteza imeni A. V. Topchiyeva Akademii nauk SSSR (Institute of Petrochemical Synthesis, Academy of Sciences, SSSR)

SUBMITTED: 30Jun64 ENCL: 00 SUB CODE: SS, OC

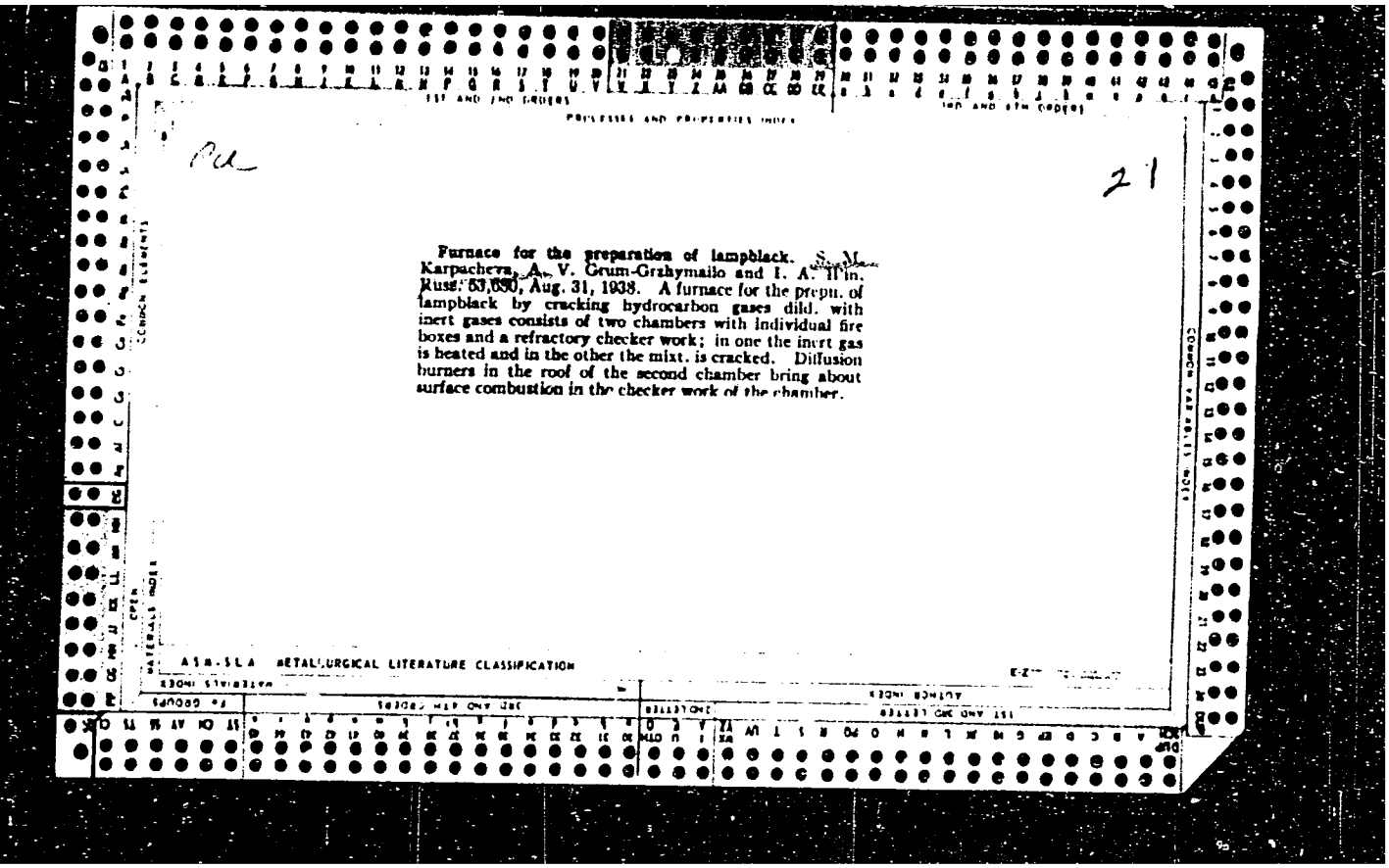
NO REF SOV: 000 OTHER: 000 ATD PRESS: 3197

Card 2/2

KARPACHEVA, S.M., doktor khimich. nauk; CHEMARIN, N.G., kand.tekhn.nauk; BYCHKOV, A.Ye., inzh.; ZAKHAROV, Ye.I., inzh.; DEVYATKIN, V.I., inzh.; ZHDANOV, B.V., inzh.

Study of the operation of a pulsating extraction sieve plate column. Khim. i neft. mashinostr. no.1:24-27 Ja '65.

(MIRA 18:3)



Furnace for the preparation of lampblack. S. M. Karpachevs, A. V. Grum-Grzhymailo and I. A. Il'in. Russ. 53,650, Aug. 31, 1938. A furnace for the prepn. of lampblack by cracking hydrocarbon gases dild. with inert gases consists of two chambers with individual fire boxes and a refractory checker work; in one the inert gas is heated and in the other the mixt. is cracked. Diffusion burners in the roof of the second chamber bring about surface combustion in the checker work of the chamber.

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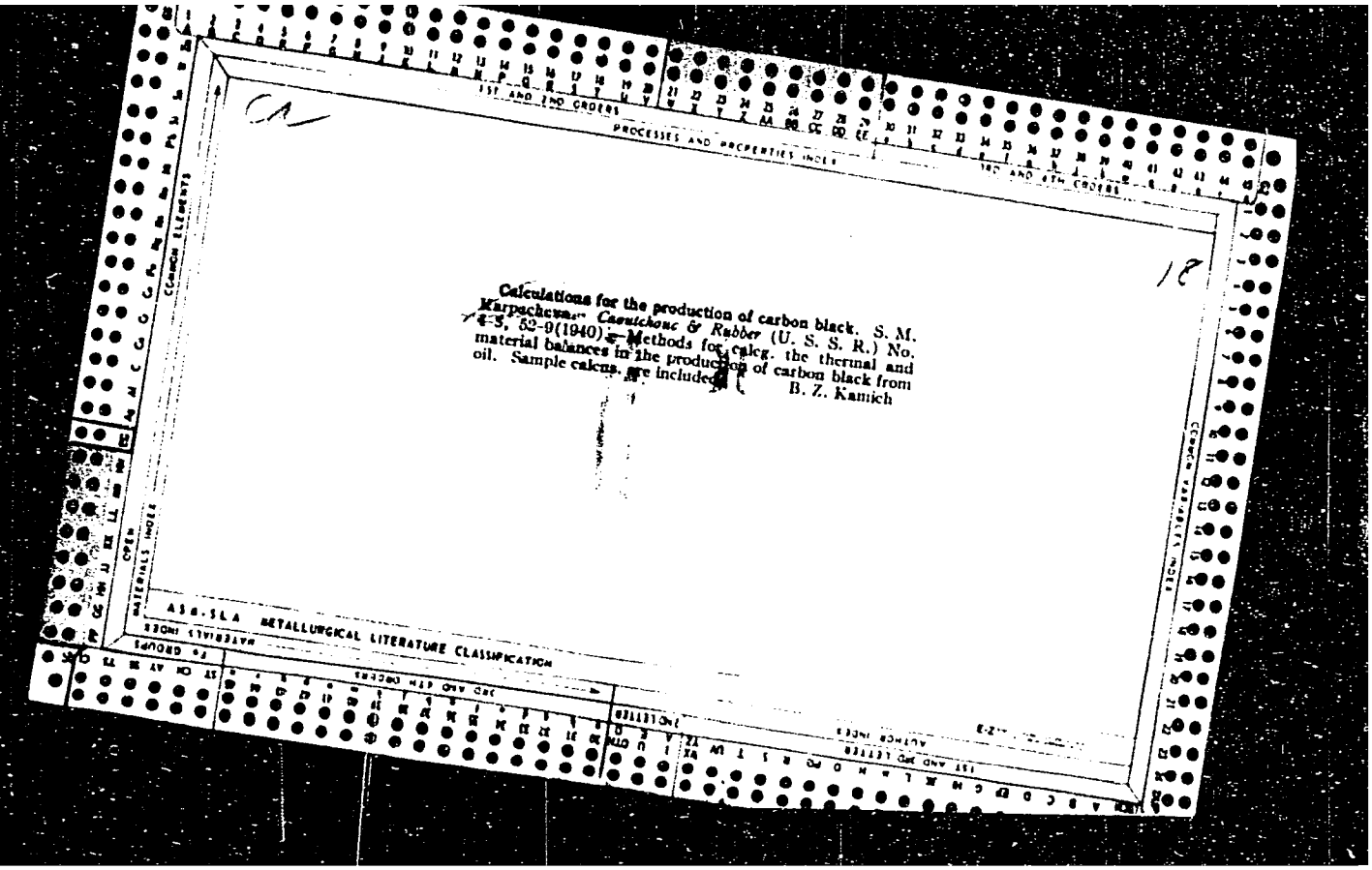

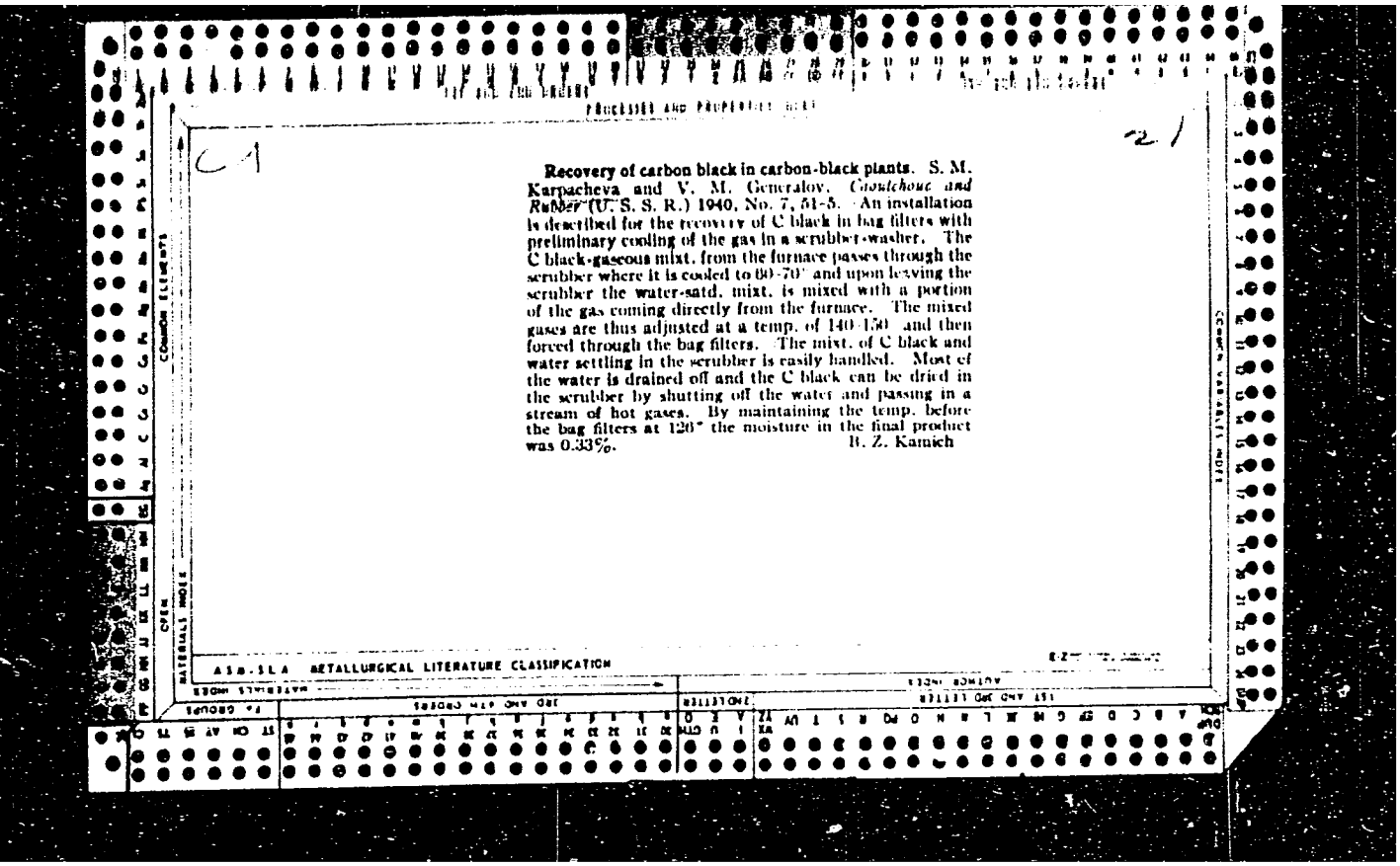

C-1

Recovery of carbon black in carbon-black plants. S. M. Karpacheva and V. M. Generalov. *Goutchouc and Rubber* (U. S. S. R.) 1940, No. 7, 51-5. An installation is described for the recovery of C black in bag filters with preliminary cooling of the gas in a scrubber-washer. The C black-gaseous mixt. from the furnace passes through the scrubber where it is cooled to 60-70° and upon leaving the scrubber the water-satd. mixt. is mixed with a portion of the gas coming directly from the furnace. The mixed gases are thus adjusted at a temp. of 140-150° and then forced through the bag filters. The mixt. of C black and water settling in the scrubber is easily handled. Most of the water is drained off and the C black can be dried in the scrubber by shutting off the water and passing in a stream of hot gases. By maintaining the temp. before the bag filters at 120° the moisture in the final product was 0.33%.
B. Z. Kamich

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ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

CA

Oxygen^{18} as indicator in heterogeneous catalysis. S. M. Kutzcheva and A. M. Rozen. *Doklady Akad. Nauk S.S.S.R.* 68, 1057-60(1949).—(1) The fate of O^{18} incorporated into the catalyst by the exchange $H_2O^{18} + MO^{16}$ $\rightleftarrows$ $H_2O^{16} + MO^{18}$ was investigated in 3 reactions, (*a*) surface combustion of H_2 on grog, Fe_2O_3, quartz, or dunite, (*b*) oxidation of CO on MnO_2, (*c*) dehydrohalogenation of BuOH on Cr_2O_3 10 + Al_2O_3 90% or on kaolin, in all 3 cases under flow conditions, by d. detns. of the H_2O directly produced in reactions *a* and *c*, or that obtained by reduction with H_2 of the CO_2 produced in reaction *b*. Whereas incorporation of O^{18} by the above exchange is easy, and particularly fast (equil. reached in 1 sec.) with MnO_2, the exchange $H_2O^{16} + MO^{18} \rightleftarrows H_2O^{18} + MO^{16}$ at less than 800° was mostly unsuccessful, except on MnO_2. The amts. of O^{18} incorporated in the catalysts were, (*a*) in quarts, 5, in grog, Fe_2O_3, and dunite, 14–17 γ/g., (*b*) 157–250 γ/g. (no data for *c*). In all 3 reactions, significant amts. of O^{18} were found in the products. That this H_2O^{18} is formed primarily, not by the secondary exchange $MO^{18} + H_2O^{16}$, was demonstrated by passing H_2O over the catalyst, which resulted only in very slight enrichment in O^{18}. It follows that reaction *a* (at 400–800°, time of contact 0.6 sec.) involves direct participation of the catalyst which undergoes alternating reduction by H_2 and reoxidation by O_2. The same applies to reaction *b* (at 200–250°, time of contact 1.5–4.0 sec.); exchange between MnO_2 and CO_2 takes place at as low as 70–80°, with air only at about 200°. For reaction *c* (350–470°, time of contact 0.55–8 sec.), direct participation of the catalyst was demonstrated by comparison of the d. of H_2O produced in parallel expts. with O^{18}-enriched and nonenriched catalysts. (2) All 3 catalysts were found also to promote the exchange (*d*) $H_2O^{18} + {}^1/_2 O_2^{16} \rightleftarrows H_2O^{16} + {}^1/_2 O_2^{18}$, in the same order of activities as in reactions *a*, *b*, and *c*. This exchange can be catalyzed in 2 ways, either by a "hydrate" mechanism wherein the metal oxide combines with H_2O^{18} and the resulting hydroxide exchanges O^{18} with adsorbed O_2^{16}, or by an "oxygen" mechanism involving formation and decompn. of higher oxides. Exchange by a purely adsorptive mechanism was observed with a CuO catalyst, inactivated for the $H_2O^{18} + MO^{16}$ exchange by repeated treatment with H_2O. This passivated catalyst still remained active in the exchange *d*; it also proved to have a high activated-adsorption capacity for O_2. This type of purely adsorptive exchange catalysis, involving no chem. participation of the catalyst, is, however, not general. In particular, it could not be realized with MnO_2 which always is itself involved in a chem. reaction. MnO_2 is also characterized by a very low activation energy for *d*, 7 kcal./mole as against 23 for CuO.

N. Thon

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Oxygen exchange between oxide catalysts and water vapor. S. M. Karpacheva and A. M. Rozen. *Doklady Akad. Nauk S.S.S.R.* 73, 55-8(1950); cf. *C.A.* **44**, 917*e*.—Rates of exchange of O^{18} between metal oxides MO and H_2O vapor were detd., both in the forward direction, $MO^{16} + H_2O^{18} \rightarrow MO^{18} + H_2O^{16}$, and in the reverse direction by measurements of the O^{18} content in the initial and the reacted H_2O (by the excess d.). On a Cr_2O_3 10% + Al_2O_3 90% contact, on active Al_2O_3, on MnO_2, and on granulated CuO, the exchange is characterized by a sharp slowing down with progressing satn., resulting in a quasi-equil. and practical cessation of further exchange at a considerable distance from the true equil. distribution of O^{18} between the oxide and the vapor. With rising temp., the rate of exchange increases, and the quasi-equil. comes closer to the true equil. Thus, on Al_2O_3, the degree of exchange A (ratio of the actual excess concn. of O^{18}, in γ per g. O, and of its equil. concn.) attained at 200°, 400°, and 600°, was 20, 30, and 50%, resp., and at 800°, A = 97% was reached in 80 min. MnO_2 was completely satd. with O^{18} in 70 min. at 700°. With the least active contact, CuO, A = 45% at 800°. On Cr_2O_3 + Al_2O_3, variation of the contact time from 0.70 to 2.3 sec., and fragmentation of the pellets by a factor of 8, did not change either the rate or the exchange of A; consequently, diffusion is not rate-detd. The cessation of the exchange at a considerable distance from the equil. is explained by the kinetic heterogeneity of the contact surface, with only part of the O atoms of the oxide capable of exchange. In the back exchange, all the excess O^{18} introduced was given up, i.e. the back exchange proceeds to completion. However, only the O^{18} introduced at the same, or at a lower temp., was given up in the back exchange; thus, O^{18} introduced into the oxide at 400° was not completely given up at 200°, but only at 400°. Activation energies E calcd. from the reciprocal times necessary to attain a stated A, were: active Al_2O_3, A = 5, 20, 30%, E = 1.75, 5.1, 7.5 kcal./mole; ignited Al_2O_3, A = 2, 4%, E = 2.9, 4.8; Cr_2O_3 + Al_2O_3, A = 4, 10%, E = 2.3, 9.0 kcal./mole. The increase of E with A is very nearly linear, as in activated adsorption on uniformly heterogeneous surfaces. The same kinetic equation, $dA/d\tau = ce^{-\beta A}$, where τ = length of time of treatment, applies to both activated adsorption and to O^{18} exchange. This is demonstrated by the linearity of A as a function of $\ln\tau$, in forward and in back exchange on active Al_2O_3 and on CuO. The analogy between the isotopic exchange and activated adsorption is plausible on account of the large sp. surface area of the oxides (100-300 sq. m./g.); one cc. of the oxide can be represented by a film about 10^{-4} mm. thin, and diffusion across such a film would require only 10^{-8} sec., as compared with the duration of the expts. of ~100 min. On the other hand, activated adsorption involves also some amt. of bulk sorption. N. Thon

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Exchange between some oxides and liquid water, alcohol, and gaseous oxygen. S. M. Karpacheva and A. M. Rozen. *Doklady Akad. Nauk S.S.S.R.* 75, 239–42(1950); cf. *C.A.* 45, 1855b.—Effective forward ($MO^{16} + H_2O^{18} \rightarrow MO^{18} + H_2O^{16}$) and back exchange ($MO^{18} + H_2O^{16} \rightarrow MO^{16} + H_2O^{18}$) between liquid H_2O and metal oxides MO, at room temp., were observed with a $Cr_2O_3.Al_2O_3$ catalyst, active Al_2O_3 (a dehydration catalyst), active ZnO (also a dehydration catalyst), and SiO_2 gel; the rates of exchange are lower than with H_2O vapor at higher temps. In the presence of liquid H_2O, the oxides evidently form hydrates, and the exchange possibly proceeds over formation and decompn. of hydrates. Similar exchange was also observed between the tagged oxides and liquid EtOH or AcOH; this is taken to indicate solvate formation with these oxides even at room temp. Back exchange between a tagged oxide and gaseous O_2 was observed, with MnO_2 at as low as 70–80°, $CaCO_3$ at 350°; V_2O_5 at 450°, and with natural dunite at 800°. The result with MnO_2 is in conflict with Morita (*C.A.* 34, 2237³) who found beginning exchange only at 300°. On CuO, exchange is unmistakable at 800°, again in conflict with M.'s conclusion of absence of an exchange. Kinetically, the amt. exchanged, with either H_2O vapor or gaseous O_2, is proportional to the log of time; at the same stage, exchange with O_2 is lower than with H_2O vaper. In a flow system, the exchange is detectable only with sufficiently long contact times τ; thus, between CuO and H_2O vapor or O_2, the min. τ required is 3.5 and 7.6 sec., resp. It is possible that over very long times, O^{18} exchange between an oxide and air would be detectable even at room temp.; the well-known difference of the O^{18} content of natural water and air might be due to such an exchange between $CaCO_3$ and air. The question whether traces of H_2O in the oxide are necessary for the O^{18} exchange between it and O_2 (or air) is still open. Failure by Valnshtein and Turovskii (*C.A.* 44, 7129c) to detect exchange at 350° on MnO_2 dried at 550° may be due to either the drying or else to partial dissocn. to Mn_2O_3 which could be tantamount to loss of just the mobile and easily exchangeable O. If the catalytic activity of an oxide is characterized by the lowest temp. at which it is able to catalyze an oxidation, the order of activities of MnO_2 (room temp.), V_2O_5 (350–450°), and CuO (800–850°), coincides with the order of ease of exchange of O^{18} with O_2. The catalytic activity of an oxide for oxidation is, consequently, linked with the mobility of its O. N. Thon

1951

KARPACHEVA, S.

USSR/Chemistry - Catalysts 21 Nov 51

"Oxygen Exchange Between Alcohol Vapors and Dehydration Catalysts," S. Karpacheva, A. Rozen

"Dok Ak Nauk SSSR" Vol LXXXI, No 3, pp 425, 426

In previous work it was shown that the O_{18} in active oxides is capable of exchange with water vapor and certain liquids. O^{18} was introduced into the catalyst (Al_2O_3). Alcoholic vapors 1st at 200°, and then at 400° were passed over the catalyst. The oxygen was exchanged from the catalyst to the alcoholic vapors 2-3 times faster than in the case of water. At the lower temp the exchange passed

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through 2 stages: 1st there was a decompn of the alc as a result of the formation of alcoholates; then a decompn of the alcoholates back into the original products (alc and Al_2O_3). Similar expts at 300° were carried out over kaolin, chromaluminum and zinc oxide. Dehydration resulted from the 1st 2, and dehydrogenation from the 3d. It is certain that all catalysts used form intermediate compds with alc, whether there is dehydration or not.

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KARPACHEVA, S. M.

The mobility of the oxygen of manganese dioxide and the catalytic oxidation of carbon monoxide. S. M. Karpacheva and A. A. Rotnic. Zhur. Fiz. Khim., [illegible] cf. C.A. 44, 9117c; 45, 2225h.—The mobility of the O of MnO_2 samples that have undergone different treatments was studied for the exchange reaction with gaseous O and for the catalytic oxidation of CO. The expt. results show that the MnO_2 catalyst reacts in each case with the gaseous reaction mixt.; this indicates the possibility of formation of an intermediate compd. The oxidation of CO is brought about by the reduction of the oxidized contact surface. J. Roytar Leach